

Southern Power & Industry

The Industrial and Power Journal of the South and Southwest

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61

***Types
or
Floor
Finishes***



How wood floors were re-
finished in a North Caro-
lina textile mill P. 34

How concrete floors were
resurfaced in a North Car-
olina tobacco processing
plant P. 32



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Wherever power is needed the 'ENGLISH ELECTRIC' Group is there creating new and more efficient means to generate, distribute and use it. Every 'ENGLISH ELECTRIC' job is backed by world-wide technical achievement, advanced research and manufacturing experience in five continents.

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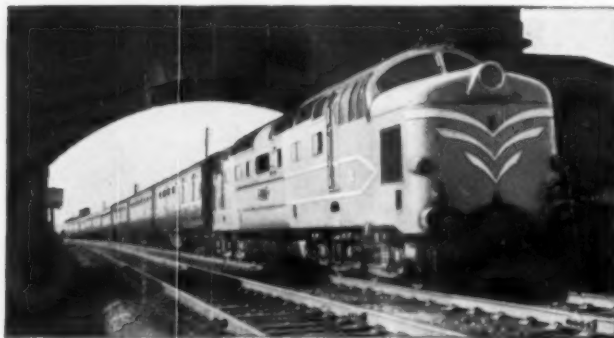


The Sir Adam Beck-Niagara Pumping-Generating Station in Canada incorporates six 'ENGLISH ELECTRIC' Deriaz variable pitch reversible pump/turbines. Each is rated at 45,500 h.p. as a turbine under 83 ft. head, and will discharge as a pump 4,000 to 5,000 cubic feet per second under heads from 59 to 90 ft. The pump/turbines, of a new basic design developed by 'ENGLISH ELECTRIC' in England, were supplied to the Hydro-Electric Power Commission of Ontario by English Electric Canada, a division of John Inglis Co. Ltd., and manufactured at Toronto. This illustration shows a runner hub assembly at the John Inglis plant.



On the 45-in. Universal Slabbing Mill at the Abbey Works of The Steel Company of Wales, the ingots are transferred from soaking pits to the mill by means of electrically driven rail cars. The drives and remote control scheme were engineered and supplied by 'ENGLISH ELECTRIC'. With the aid of fifteen television cameras and monitors in a closed circuit system, designed and installed by Marconi's Wireless Telegraph Co. Ltd., the operator is able to follow every stage of the operation and to control the vehicles with speed and accuracy.

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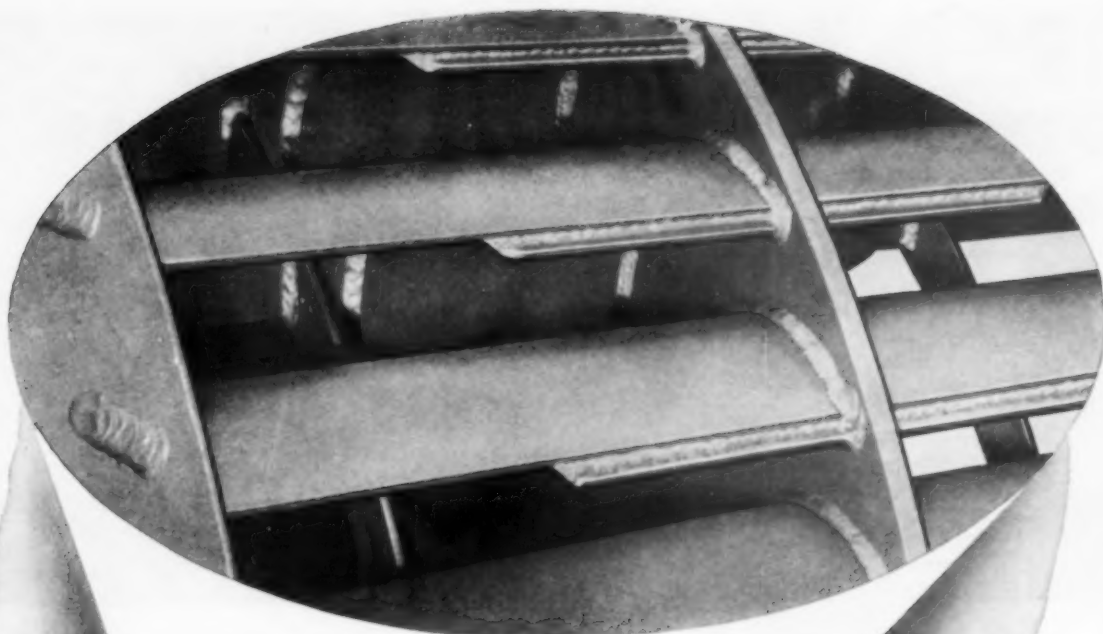
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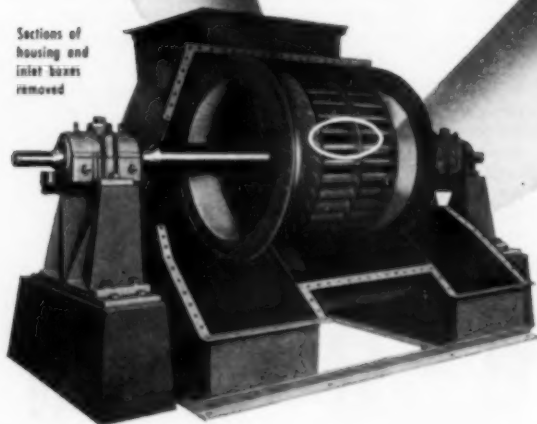
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THEY
BELONG . . .** *wearing plates
on the FACE
of the blades*

Sections of
housing and
inlet boxes
removed



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SOUTHERN POWER & INDUSTRY for JUNE, 1961

For more information, Use Reply Card—Page 85

1

Have you ever been troubled by any of these steam trap problems?



ARMSTRONG STEAM TRAPS are designed and made to eliminate these problems

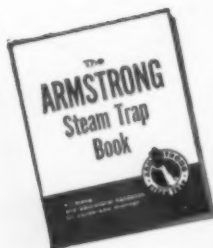
BACK PRESSURE . . . Armstrong Traps operate on any back pressure—or vacuum, for that matter. As long as there is a pressure differential across the trap, it will close on steam and open for condensate. Even the high back pressure caused by blow through of one or more traps in the system will not disturb Armstrong Traps. Other than a reduction in capacity, Armstrong Traps are unaffected by back pressure.

DIRT . . . Armstrong Traps are not affected by ordinary dirt. When the trap opens condensate swirls down under the edge of the bucket and up through the discharge orifice. Dirt is kept in suspension and discharged along with the condensate. For very bad dirt conditions, Armstrong offers traps with integral strainers. These cost less than a trap plus a separate strainer.

AIR BINDING . . . Armstrong Traps cannot air bind. Air in the system passes through a vent in the top of the bucket. It collects in the top of the trap and is discharged with the condensate. There is no chance for it to stop the trap. For low pressure on-and-off units where large amounts of air accumulate while the steam is off, Armstrong offers open float and thermostatic air vent traps in a complete range of sizes.

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880 Series, side inlet, side outlet.



No. 801, side inlet, bottom outlet.



880 Series, integral strainer.



200 Series, bottom inlet, top outlet.



Forged Steel Series for high pressures, high temperatures.

The 48 page Armstrong Steam Trap Book tells how to correctly size, install and maintain steam traps for any pressure, any temperature, any load plus full catalog data on Armstrong Steam Traps. Ask for Catalog K.



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Southern Power & Industry

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Managing Director

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Francis C. Smith, Editor

Milton C. May..... Field Editor
P. O. Box 11015, Charlotte, N. C.

Baron Creager.....Southwestern Editor
6131 Luther Lane, Suite 208, Dallas 25, Texas

J. P. Warren..... Editorial Consultant
Box 483, Ingram, Texas

Mary M. Lyon..... Editorial Assistant

J. A. Moody..... Production Mgr.

H. Redfern Hollins..... Promotion Mgr.

Richard L. Priess..... Advertising Mgr.

BUSINESS REPRESENTATIVES

BOSTON: J. Doug Parsons, 39 Atlantic Ave., Cohasset, Mass. Tel. Evergreen 3-0712.

CHARLOTTE: W. Cliff Rutland, Box 102, Gastonia, N. C. Tel. University 7-7995.

CHICAGO: Hugh Aull, 333 N. Michigan Ave., Chicago 1, Ill. Tel. Central 6-6964.

CLEVELAND: Joseph B. Rogers, 16404 Southland Ave., Cleveland 11, Ohio. Tel. Clearwater 1-9063.

DALLAS: Baron Creager, 6131 Luther Lane, Suite 208, Dallas 25, Texas. Tel. Emerson 3-1543.

LOS ANGELES: Warren R. Christian, 4115 Edenhurst Ave., Los Angeles 39, Calif. Tel. Hollywood 2-1133.

NEW YORK: William L. Rogers, Room 610, 7 East 42nd St., New York 17, N. Y. Tel. Murray Hill 2-4959.

PHILADELPHIA: James R. Corgie, 27 East Windermere Terr., Landsdowne, Pa. Tel. Madison 6-9145.

SAN FRANCISCO: Fred Jameson, 821 Edinburg St., San Mateo, Calif. Tel. Diamond 3-8806.

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There's a Lot of Loose Talk in Washington 24

Zero Accidents Hard to Achieve — Du Pont Record 26

Wood for Big Structural Elements in Arkansas Mill 28

Portable Pump Rig Simplifies Testing — West Virginia 31

Hard Working Floors — North Carolina Tobacco Plant 32

Urethane Finish Adopted After Tests — Textile Mill Report 34

Instruction That Can Be Understood — Equipment Installation 35

Keep Ahead of Controller Failures — Texas Engineer Tells How 36

Digital Computer Performance in Power Plants — Louisiana 40

Management Clinic — Scale for Disciplinary Practices 41

Eight Ways to Get the Most from Flexible Connectors 42

Another Job for Polyester — Tennessee Corp. 43

Centrifugal Pump Problems — More About NPSH 44

Better Maintenance Can Improve Steam Trap Performance 46

Heat Pump Cuts Conditioning Cost for New N. C. Plant 49

Techniques of Casualty Investigations — South Carolina 50

Conveyor Belt for 45° Idler Operation 58

Good Personal Traits Make Good Employees 60

Cheaper Well Cleaning — Experience in Mississippi 62

Air Compressor Valve Troubles — Louisiana 64

Facts & Trends 10 Timely Comments 26

News of the South 14 New Product Briefs 74

Future Events 21 Catalogs & Bulletins 84

Industry Speaks 24 Index to Advertisers 94

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SOUTHERN POWER & INDUSTRY for JUNE, 1961

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POWER PIPING



HEADQUARTERS





Facts and Trends

June, 1961

- ◆ **PROFESSIONAL STATUS**—At a meeting of the Department of Conditions of Practice, which is concerned with the professional aspects of the American Society of Civil Engineers, James M. Gongwer of Chevy Chase, Md., said that "we must ultimately decide whether we are professional men or business men."

He said this was the "fundamental issue" in the Society's objections to one provision in the so-called Model Law for engineering practice as set forth by the National Council of State Boards of Engineering Examiners. This provision would permit the formation, and practice, of an engineering firm when only one member of the firm is a registered engineer, and names of non-engineers could appear in the firm name of a corporation. The objection is not what engineers do, but what non-engineers might be permitted to do under the law, Mr. Gongwer stated. Such an arrangement is not in the best interests of either the public or the engineering profession.

- ◆ **SEA WATER CONVERSION**—At a convention session of the American Society of Civil Engineers, R. W. Spencer of Los Angeles gave a report on the sea water conversion plant of the Southern California Edison Company at Mandalay, Calif. The conversion plant is operated in conjunction with a steam power plant, supplying water for power.

Noting that the Mandalay conversion plant had been in operation for over a year, Mr. Spencer produced figures to show that the first-year operating costs averaged \$1.92 for producing 1,000 gallons of fresh water from the sea. This is far above the cost of water supplied by other sources. He said it is apparent that sea water converted in this way can be competitive only for special industrial uses, or where a natural water supply is a long distance away.

- ◆ **AIR-BLAST CIRCUIT BREAKER**—The world's fastest operating transmission-type power circuit breakers have harmlessly extinguished in less than two cycles the highest currents ever recorded on field tests for 138 kv equipment. The breakers successfully interrupted 40,000 amperes at the American Electric Power System's Philip Sporn Plant substation, New Haven, West Virginia.

The two-cycle, 138 kv air-blast breakers, manufactured by General Electric's High Voltage Switchgear Department, were put through power interruption tests with line faults ranging from 9100 through 40,000 amperes. The 138 kv, 1600 ampere breaker was subjected to a series of close-opening tests on grounded and ungrounded faults. A total of nine faults were interrupted, ranging from 2800 Mva through 9930 Mva.

- ◆ **MANUAL ON INDUSTRIAL WATER**—The Manual on Industrial Water and Industrial Waste Water published by the American Society for Testing Materials, is intended as a brief reference source of information for three types of users; executives and plant designers; individuals engaged in industrial operations involving

(Continued on page 10)



This compact Package Air Preheater is being installed on a 150,000 lb/hr boiler at Olin Mathieson Chemical Corp.'s Brandenburg, Kentucky, petrochemical plant. When in operation it will recover enough heat from the boiler exhaust to increase efficiency of the boiler between 8% and 9%.

OLIN MATHIESON RECOVERS 360°F FROM BOILER EXHAUST WITH 11½' x 11' x 8' PREASSEMBLED LJUNGSTROM® PACKAGE AIR PREHEATER

Olin Mathieson specified a Ljungstrom Package Air Preheater because it saves space as well as fuel. Mathieson's Ljungstrom occupies only about 1000 cubic feet, but cuts boiler exhaust temperature from 680°F to 320°F — puts 360° of heat back to work in the boiler.

The compact preassembled Package Air Preheater is ready to run when it's delivered—just connect to the power line and ducts, and it's on-stream. You make big savings on installation because there's no on-the-spot erection.

You can use a Ljungstrom Package Air Preheater on boilers from

25,000 to 250,000 pounds of steam per hour. For more information, write today for your free copy of a 14-page booklet.

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Superintendent, "... simplifying anything, including lubrication, pays off in improved efficiency."

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In some plants, Gulf engineers have found more than *three* times the number of lubes actually needed for efficient operation. This means three times as many ordering, billing, stocking and handling problems. And it also means three times as many chances for human errors.

Examples: One large electrical appliance manufacturer slashed lubricants from dozens to just 6. In addition, a well-known paper company pared lube brands from 39 to 13.

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Plant Engineer, "... a simplified lube inventory means reduced paperwork, fewer handling and stocking problems."



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Perhaps there are opportunities in *your* plant for simplified lubrication. A Gulf Sales Engineer is available to help you find them. Contact him at your nearest Gulf office. Or, write today for pamphlets on Gulf multipurpose lubes.



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Facts and Trends (Continued)

the use of water; and analysts, operators of special instruments, engineers, and consultants.

This edition of the Manual represents a substantial expansion of the first edition. It has been designed to satisfy the growing need for dependable information about water and the problems its use entails. In this second printing two standards have been added: Cation-Exchange Materials-Sodium Cycle, Operating Performance of; and Phenolic Compounds in Industrial Water and Industrial Waste Water. Copies of this 674 page book may be obtained from ASTM Headquarters, 1916 Race Street, Philadelphia 3, Pa., at \$11.00 each.

- ◆ **SOLUTION MINING**—Plans for a pilot plant test and test wells for the solution mining of potash were recently announced by David G. Hill, president of Pittsburgh Plate Glass Company, and William Wood Prince, chairman of the board of Armour and Company.

The experimental unit will cost approximately one million dollars. Following completion of successful pilot operations, a joint company to produce muriate of potash in a large multi-million dollar commercial plant located in Canada will be formed by Armour and Company and Pittsburgh Plate Glass Company. The process will compete with the rock mining process.

- ◆ **CORAL GABLES OIL CENTER**—Six oil companies have set up divisions in Coral Gables, Florida. Gulf shifted its Western Hemisphere oil prospecting division there to permit closer, faster communication with oil exploration in Central and South America. T. A. Kibby will manage the 26 employee office.

Other companies with Coral Gables offices are Esso Standard S.A. Ltd., with 120 employees, which moved in last year when Castro nationalized its Cuban operation; California Exploration Co., with eight employees, a subsidiary of Standard of California; International Petroleum, which like Esso is a subsidiary of Standard of New Jersey, with 100 employees and Continental Oil of Venezuela, subsidiary of Continental of Delaware, with eight employees. In addition, Tropical Oil, dealing exclusively in propane gas, has its executive offices in Coral Gables with 25 employees while Coastal Petroleum Co., another independent, has an office in adjoining Coconut Grove.

- ◆ **HIGH FREQUENCY BUS DUCT**, for transmitting electrical power in frequencies from 180 to 20,000 cycles, has been introduced by the Standard Control Division of Westinghouse. With its use, a central power plant can service an entire plant, with no need for small, individual high frequency generators. Voltage drop is less than 1 volt per 100 feet at 400 cycles, based on an equally distributed load, line to neutral value, at the most unfavorable power factor.

Installation can be made with the same ease as for other bus duct systems, requiring only that the duct be hung in place and joined with other sections. Power is taken off by plugging in, at take-offs located every 30 inches along the run. If an installation is expanded or rearranged, all of the duct is reusable, without cutting or splicing. The duct measures 9 5/8 inches wide by 3 7/8 inches high, and weighs only 13 pounds per foot. Normally it is furnished in 10-foot lengths but shorter lengths and special fittings are available.

(Continued on page 12)

ONE OF A SERIES OF CHATS ABOUT
CONSERVATION AND CONTROL OF HEAT

SARCO TOPICS

SO YOU THINK YOU'VE GOT TEMPERATURE CONTROL PROBLEMS

When plant men get together and talk about their temperature control problems, strong men may weep. It's so darned basic—that narrow range of degrees which must be maintained—so closely allied to profit and loss. Let us tell you about one situation that may even top yours, and may clue you in on a good solution. It concerns wine, of all things.

Take those basic temperatures. Wine must be pasteurized at 140°F. Those are the facts of life in the world of wine. They might not seem too difficult to live with unless you are concerned with heat. Then you probably know how tough things can get when you have a rendezvous with a thermometer.

Take New York's Monarch Wine Company, producers of Manischewitz Wines. Their Problem: how to maintain the 140° temperature in the heat exchangers despite wide variations in the rate of wine flow. These variations, between 5 to 60 gallons per minute, result from slowdowns and recoveries in the bottling process. Problem: entire system must be capable of complete shutdown when necessary. Problem: wine temperatures must be raised to 140° as rapidly as possible, sometimes an immediate jump of 100°.

Attracted perhaps by aspects of the situation that had little to do with pure science, Sarco engineers applied the collective experience of Sarco technology to the solution

of this serious problem. The result for Monarch: the degree of control the process demanded—achieved through the excellent use of Sarco Temperature-Pressure Regulators, Float Thermostatic Steam Traps, Thermo-Dynamic Steam Traps, and Pipeline Strainers.

Sarco engineers, ever resourceful, divided each of the two large Cherry-Burrell plate-type heat exchanger units into two separate



sections with a blank baffle plate, each with a separate Sarco control. Thermal sensing bulbs were installed in wine discharge and throttling controls hooked into steam supply. As demand fluctuates, one or both regulators function to maintain the 140° temperature. In higher demand, both regulators are operative; as demand drops and flow decreases, only one regulator supplies steam. Pasteur himself would have been elated.

Each of six smaller capacity shell-and-tube heat exchangers required only one regulator, with the sensing bulb inserted into the outlet side of the wine filled shell, and the regulator throttling steam supply to the tube section. Thus, by controlling flow of steam to the exchangers on the basis of pressure and temperature, the Sarco regulators were able to maintain the temperature of the wine at precisely 140° regardless of fluctuations in demand or supply rate. Whew! A lot of engineering went into those two sentences.

From here on it's downhill. To secure complete cut off of the steam supply during scheduled shutdowns of the bottling run, solenoid valves were provided to supplement normal modulating action of the controls. To discharge widely varying loads of condensate continuously and remove immediately all air and incondensable gases, Sarco Float Thermostatic Steam Traps were installed on all condensate outlets. On the drips before each control valve a Sarco Thermo-Dynamic Steam Trap was installed to insure delivery of dry steam. Sarco

Pipeline Strainers were installed before all steam traps and valves to protect them against damage by any foreign bodies. And thus ends a classic story of the grape.

Still, this story has been condensed far too much, really, and we feel you've been cheated out of the story's more delicious details. You needn't be, however. We've printed the facts in detail for posterity and you in Sarco Case History 185, complete with drawings that practically make it a do-it-yourself kit. If you would like a copy, we will be flattered to receive your request, and dispatch it with dispatch.

SOUTHERN COMFORT

It's true what we've said all along about Dixie: Sarco is well represented in the South. In fact, there are Sarco representatives in 29 southern cities. This means that your pesky problems of conserving and regulating heat have available solutions nearby. No room for addresses and phones here, but here are the southern Sarco cities and the organizations to call:

Alabama, Birmingham, Bratton Sales Engineers; Arkansas, Little Rock, J. L. Brown Sales Co.; D. C., Washington, Sarco Company, Inc.;



Florida, Pensacola, Bratton Sales Engineers; Tampa, O. H. Howell Mfrs. Agent, Inc.; Georgia, Atlanta, John F. Templeton Co.; Louisiana, New Orleans, Frank A. Birdsong; Maryland, Baltimore, J. E. Perkins Corp.; Mississippi, Jackson, Robert Porter; Missouri, Kansas City, Smith Steam Spec. Co., Inc.; St. Louis, Sarco Co., Inc.; North Carolina, Charlotte, Hoffman & Hoffman Co.; Raleigh, Hoffman & Hoffman Co.; Oklahoma, Tulsa, Vanco Engineering Co.; South Carolina, Columbia, Hoffman & Hoffman Co.; Greenville, Hoffman & Hoffman Co.; Tennessee, Knoxville, Walter F. Sutton; Texas, Dallas, Gilbert Engineering Co., Inc.; El Paso, Engineered Equipment, Inc.; Ft. Worth, Gilbert Engineering Co., Inc.; Houston, Esch and Associates, Inc.; San Antonio, L. S. Pawkett & Co.; Virginia, Richmond, Robert S. Lovelace Co.; West Virginia, Charleston, Angus Gillis and Son.

Pardon our monopolizing the conversation in this series of paid communiques, but we're trying our best to interest you in certain subjects that concern us both—to the point where you'll communicate.

4897

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STEAM TRAPS • TEMPERATURE CONTROLLERS
STRAINERS • HEATING SPECIALTIES

Facts and Trends (Continued)

- ◆ A FLEXIBLE BLANKET OF WATER which can protect against the searing temperatures of space vehicle re-entries has been developed by the Astronautics Division of Chance Vought. "Thermosorb" is composed of more than 90 per cent water, yet has the handling characteristics of a solid. In addition to space vehicle applications, it is expected to see service in fire prevention walls, protective clothing for fire fighting, shipping containers for delicate instruments and in transport vehicles for cargo fire protection.

The invention resembles a fine-grained cellulose sponge. It retains water with such tenacity that specimens have been subjected to 16 g's, or 16 times their weight, in a centrifuge without the water separating. Just what holds the water together Chance Vought won't say. Samples have been satisfactorily subjected to extreme temperatures from open flame torches and to freezing temperatures at 65 degrees below zero. A section less than half an inch thick has been held in the hand and subjected to temperatures up to 4600 F from torches for several minutes without the hand becoming uncomfortably warm. Blasted by intense heat, the Thermosorb slowly boils away, carrying with it most of the heat. A test specimen subjected to an alcohol flame for 20 minutes will lose about 1/8 inch of Thermosorb, leaving a small amount of charred residue.

- ◆ BETTER FOREST UTILIZATION—Research sponsored by Central Louisiana Electric Co., Inc. shows that utilization of the state's timber and pulpwood surpluses can double or even treble the forest industry's economic impact on Louisiana.

The fourth in a current series of CLECO studies to help boost the state's forestry business, the research completed by Frank W. Bennett emphasizes that Louisiana is preparing for the future with its reserves of timber and pulpwood. Louisiana now produces an annual surplus of 1,000,000 cords of pine growth and pulpwood growth which is more than double the amount used.

- ◆ STRONG ALUMINUM ALLOY—Aluminum castings with tensile strengths up to 50,000 psi may be made under normal foundry conditions through use of a new alloy (Tens-50) developed for use in critically loaded aircraft and missile structures.

The alloy may be used for any application demanding high-strength performance along with low weight. Reynolds Metals Company has been licensed by North American Aviation's marketing subsidiary, Navan Products, to manufacture and sell the alloy. It will be produced at Reynolds' plant at Jones Mills, Ark.

- ◆ TOO MUCH STEALING—Poor security practices are costing American companies hundreds of millions of dollars annually in losses through pilferage, in the employment of undesirables predestined to failure on the job, in loss of company secrets and valuable know-how—and in numerous other ways.

That is the conclusion of the American Society of Industrial Security, whose membership is mainly comprised of Security Personnel of top U. S. companies. "Some companies have not kept pace with the giant strides made by the security profession in recent years. The new methods and equipment developed to protect vital defense industries from espionage and sabotage can serve to protect all segments of the business community."

Facts and Trends (Continued)

- ◆ **PIEZOELECTRICITY**—A startling development in the technique of piezo-electricity has enabled the Clinton Engine Company to replace the magneto, coil, points, and condenser of their ignition system with a "spark pump" about the size of a candy bar. Piezoelectrics are materials which develop an electrical voltage when stressed.

Lead zirconate-titanate, one of the most effective piezoelectrics ever found, produces a 20,000 volt spark when nudged by a timing cam in the engine. Ease of starting with the "spark pump" makes this device a natural for outboard and inboard marine engines. A single turn of the familiar starting cord and the engine is running—no need for complex starting mechanisms.

Write the editors for additional information on any of the above items.
SOUTHERN POWER & INDUSTRY, 1760 Peachtree Road, N. W., Atlanta 9, Ga.

. REPRINTS AVAILABLE

Write the editors of SPI for small quantities of the following at no charge.

- **SESCO 1,000,000 KW PLANT**—A 16-page folder describing this large new Alabama plant, serving Alabama Power Co. and Georgia Power Co., is a combination of two technical articles from SPI's September and November issues.
- **HOW EPOXY CAN SERVE YOU**—4 pages. Tells exactly how 10 separate repair jobs were handled and describes several epoxy mixes that are good for maintenance jobs.
- **ORIFICE METER INSTALLATIONS**—Tells what the plant man needs to know about installation to get accurate, dependable service.
- **INSPECTION REPORTS**—Tells how the station chemist can maintain information on the condition of boilers, cooling towers, condensers, heat exchangers, tanks and softeners. Actual inspection sheets are presented.
- **ELECTRICAL DISTRIBUTION FOR LARGE PLANT**—An 8-page special report prepared jointly by Director of Facilities, the Consultants, and the Contractor—describing plans and installation of all electrical services for new plant of Texas Instruments Inc., Dallas, Texas.
- **THERMAL INSULATION DIRECTORY:**
Tells where to get service and technical data.....6 pages
- **WATER TREATMENT DIRECTORY:**
Tells where to get service and technical data.....12 pages
- **AIR & GAS CLEANING DIRECTORY:**
Tells where to get service and technical data.....16 pages
- **COMBINED GAS-STEAM CYCLE PERFORMANCE:**
First year report on new plant, West Texas Utilities Co.....6 pages
- **VERSATILE WASTE-FUEL BOILER:**
Tells how peanut hulls are burned to produce steam in Georgia Plant.....4 pages



the **SOUTH—SOUTHWEST**

more power . . . more plants . . . more money

St. Joe Paper Building Box Plant in Birmingham

The St. Joe Paper Company container manufacturing facilities in Birmingham, Alabama soon will be housed in a multi-million dollar plant on Vanderbilt Road. Construction is now getting under way, and completion of the 170,000 sq ft building is scheduled for early next year. The Daniel Construction Company of Birmingham is contractor, and Harry M. Payne is architect.

The red brick and steel structure will be approximately 840 ft long and 200 ft wide. It will be located on



Benjamin Foster Co. Builds Houston Plant

Benjamin Foster Company, Philadelphia manufacturer of industrial adhesives and coatings used in the protection of thermal insulations, is further expanding its operation by building a plant in Houston, Texas, scheduled for completion early in June.

The new plant, occupying 11,000 square feet on a 2½ acre tract, will increase the efficiency of Foster services on all its products in nine Southwestern states which heretofore have been served from warehouse stocks in Houston.

This expansion of Foster's manufacturing facilities conforms with the company's policy of establishing strategically located branch manufacturing plants aimed at swifter, more efficient service for its national distribution.



W. L. Thorpe

a 12-acre tract of land, with facilities for loading and unloading approximately twelve box cars on an L. & N. Railroad siding. On the south end of the building will be a covered loading area large enough for fifteen trucks. The plant will have complete designing and quality control equipment.

Upon completion of the new plant, manufacturing equipment now operated in leased quarters will be moved, and a large corrugator will be installed so that combined sheets of containerboard for manufacturing shipping containers may be produced in Birmingham. At present it is shipped from the company's box plant at Port St. Joe, Florida.

William L. Thorpe is general manager of the Birmingham plant. L. C. Houston is sales manager, C. G. Fant is office manager, and Fred Forbis is production manager.

personnel. Total employment planned by the end of this year is approximately 400.

Clark-Schwebel will produce a complete range of fiber glass fabrics and woven glass roving for high and low pressure reinforced plastics applications such as boats, radomes, aircraft structural parts, copper-clad electrical laminates, and chemical tanks, and for high temperature insulation, coated fabrics, electrical insulation and dust bag filtration.

Nuclear Research Center For Georgia Tech

More than 300 tons of steel from United States Steel's Tennessee Coal & Iron Division are being used in construction of the Nuclear Research Center at Georgia Institute of Technology in Atlanta, Ga. Blount Brothers Construction Company of Montgomery, Ala., is prime contractor.

Comprised of plates and structural shapes, the steel will go into the laboratory and office building and the adjoining reactor building.

The two-story, air-conditioned laboratory and office building will have 24,000 square feet of floor space. It will house two 50,000 curie capacity hot cells, fuel element storage and handling pool, high level radiochemistry laboratory, separate decontamination room, and a number of other related facilities.

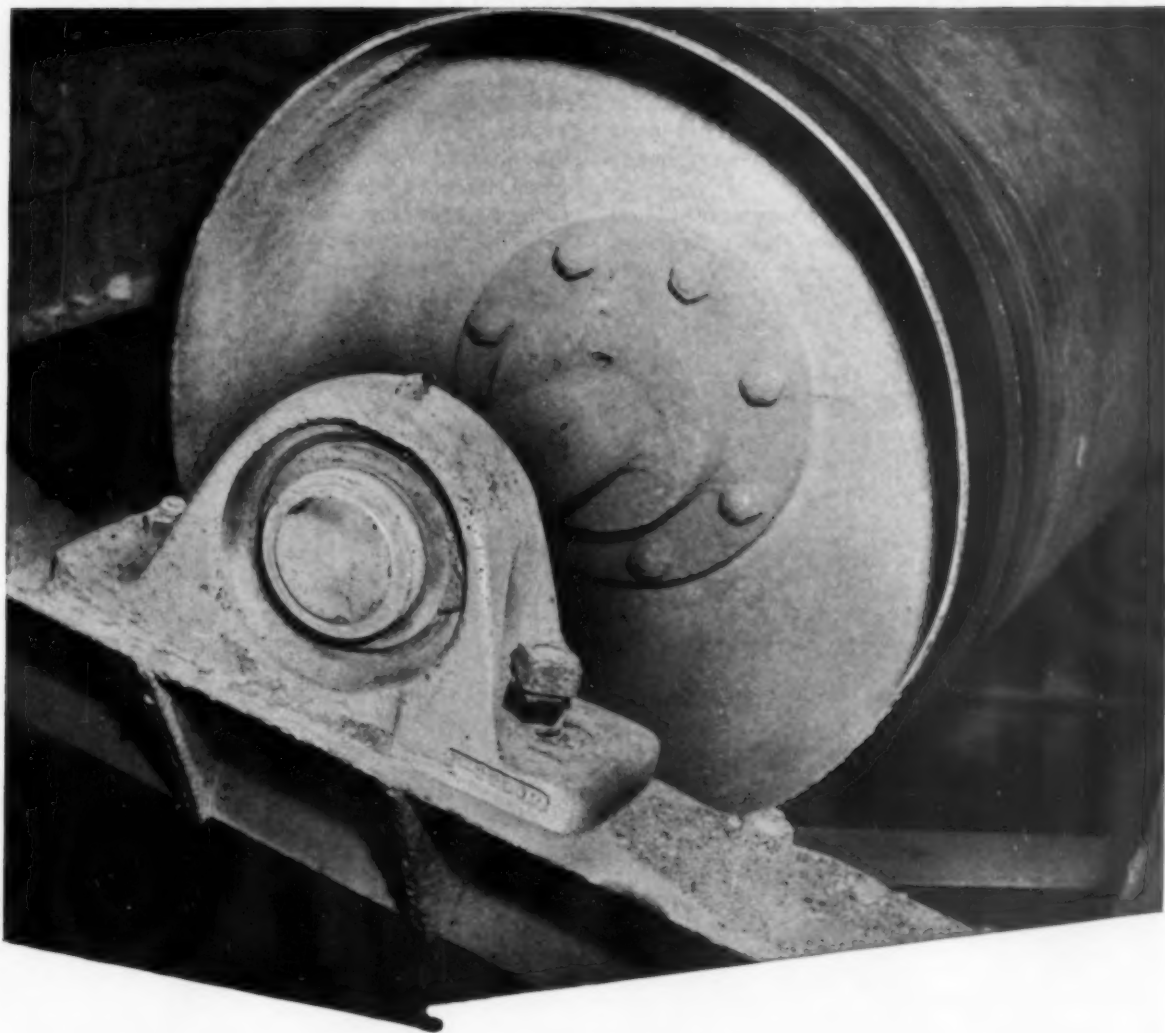
The reactor building will have three levels consisting of a basement for process and ventilating equipment, a main floor for experimental equipment and a control room located on a balcony.

(Continued on page 21)

Clark-Schwebel Fiber Glass Plant — S. C.

Clark-Schwebel Fiber Glass Corporation has started production of glass fabrics at its new \$3,500,000 fiber glass weaving and finishing plant in Anderson, South Carolina.

This 163,000 square foot plant is equipped solely with new machinery engineered specifically for fiber glass weaving and finishing. It is completely air conditioned and humidity controlled, and located on a 20 acre site for future expansion. The plant includes research and development facilities and a plastics laminate testing laboratory. It is headed by widely experienced fiber glass production



The right seals on this bearing, and service life was increased 4 times!

This conveyor belt carries wet sand. The water and sand penetrated the felt seals of the bearings and caused frequent bearing failure. Our bearing engineers were consulted and their solution was a pillow block with neoprene plyaseals. Now after more than a year of operation, our customer reports service life of the bearings has increased four times.

This is just another example of the kind of service our bearing sales engineers give their customers. We try to get the right bearings in the right application and if the result is a saving on bearing purchases — that's fine with us. Our growth over the years proves that the more we save a customer, the more he buys. We'd like to help you save on bearing purchases — Call the branch nearest you!

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Knoxville • Memphis • Nashville • VIRGINIA: Norfolk • Richmond • Roanoke

YOU CAN COUNT ON POWELL VALVES

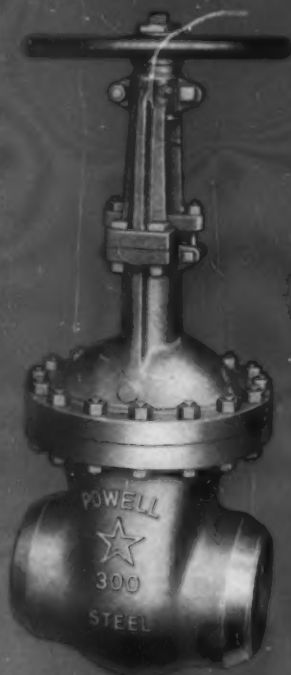
Performance proves it, year after year—you can count on Powell Valves to help you solve the toughest flow control problems of temperature and pressure found in power plants today.

This truly dependable performance results from many things—among them Powell's engineering know-how, accumulated during 115 years of valve manufacture, and the consistent use of quality

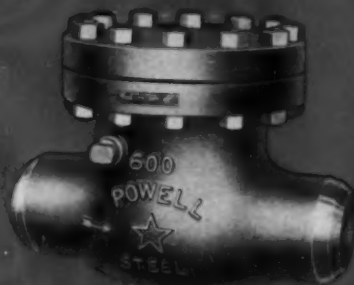
materials, quality controlled.

Then, too, you can count on getting the Powell Valve you need, when you need it. That's because Powell maintains a network of distributors backed up by factory inventories, warehoused "ready to go."

Get the full story from your nearby Powell Valve Distributor, or write us direct . . . The Wm. Powell Company, Cincinnati 22, Ohio.



300-pound Steel Gate Valve—Fig. 3003 WE. Bolted flanged yoke-bonnet. Outside screw rising stem. Interchangeable solid or split wedges, renewable seats. Sizes, 1" through 30".



600-pound Steel Horizontal Swing Check Valve—Fig. 6061 WE. Bolted cap, renewable seat and disc. Has full flow area when valve is fully open.



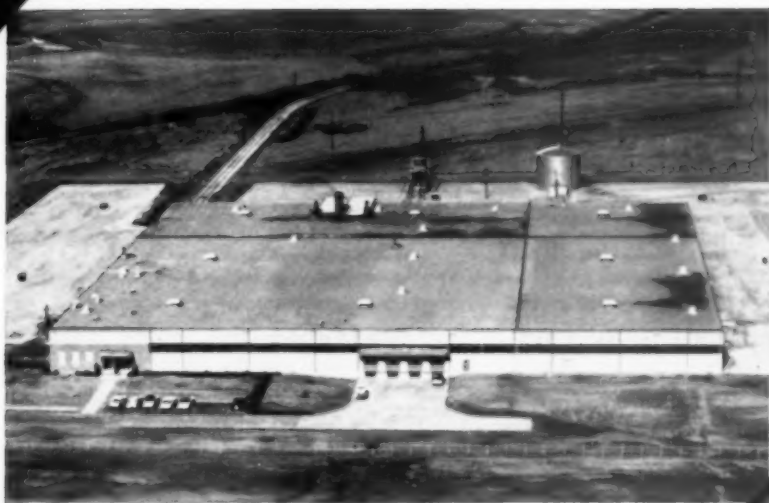
2500-pound Steel Pressure Seal Gate Valve—Fig. 125003 WE. Enclosed bevel gears facilitate operation. Valves can also be supplied with spur gearing or motor operators for remote control.

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Enterprise, Florida

Unit No. 4 is a 600/000 lb/hr
RILEY TURBO FURNACE BOILER

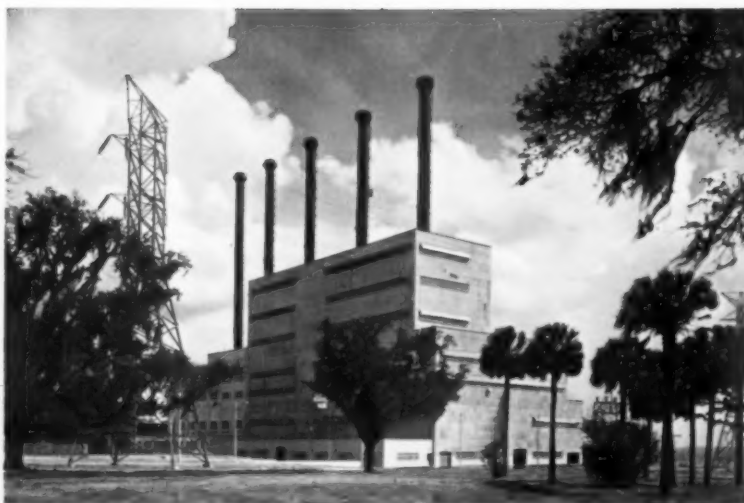
Design Pressure — 1750 psig

Superheat/Reheat — 1000°F

Fired by Natural Gas and Oil

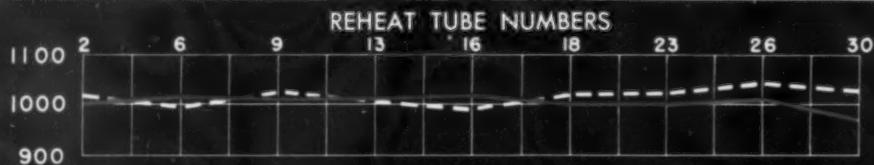
Efficiency up to 90% on oil — 86% on gas.

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Consulting Engineers

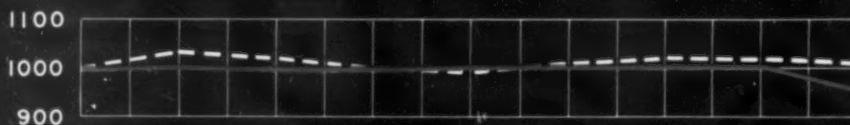


FINAL SUPERHEAT-REHEAT EXIT TUBE TEMPERATURES

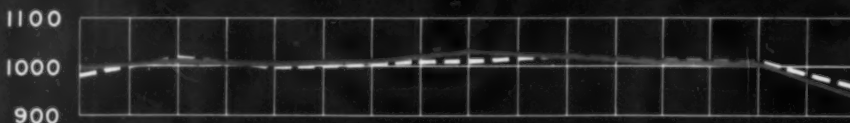
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CONTOURS**



600,000 #/hr



536,000 #/hr



400,000 #/hr



305,000 #/hr

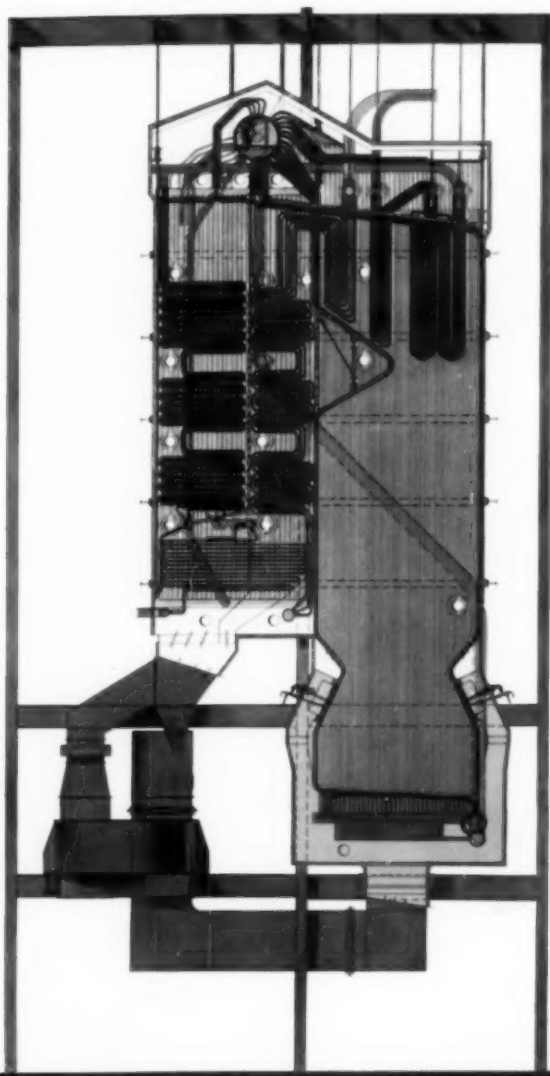


— SUPERHEATER
--- REHEATER

RILEY TURBO FURNACE

produces extremely uniform furnace exit temperature at
FLORIDA POWER CORPORATION

Uniform, safe gas temperatures across the full span of a boiler's high temperature superheater and reheater is a vital requirement for trouble-free operation. With a Riley Turbo Furnace this objective is attained . . . without use of costly auxiliary methods for distributing furnace gas.



In the Riley Turbo Furnace all fuels — gas, oil, coal — are burned at the base of the furnace well away from superheater and reheater with combustion taking place evenly from side wall to side wall. Combustion gas rises within the furnace envelope in a uniform side wall to side wall column resulting in minimum variation in metal skin temperatures of all superheater and reheater elements. Temperatures are well within safe alloy limits to assure long tube life. Proof of such performance is provided in the accompanying curves. Flame contour diagrams illustrate combustion uniformity at each load level.

The Turbo Furnace boiler is capable of operating over a 6-1 load range with oil or gas firing with all burners in service on automatic control and without burner adjustment. Design and operating characteristics of the Turbo Furnace also provide more rapid and uniform water and steam circulation, help to maintain a clean furnace, and minimize flyash and air pollution problems.



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STANDARD OIL COMPANY (KENTUCKY)

FUTURE EVENTS of Engineering Interest

June 5-9: Corrosion Short Course, Washington University, St. Louis, Mo., Greater St. Louis Section, NACE. T. J. Hull, Exec. Sec'y, National Assn. of Corrosion Engineers, 1061 M&M Bldg., Houston 2, Texas.

June 6-8: 6th Annual Appalachian Underground Corrosion Short Course, University of West Virginia, Morgantown, W. Va. T. J. Hull, Exec. Sec'y, NACE, 1061 M&M Bldg., Houston 2, Texas.

June 11-14: ASME Summer Annual Meeting, Statler Hilton Hotel, Los Angeles, Calif. Sec'y, American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

Aug. 14-17: 9th Annual Short Course in Fundamentals of Occupational Safety, Louisiana State University, Baton Rouge, La. Fred H. Fenn, Dean, College of Engineering.

Aug. 28-Sept. 1: Second International Heat Transfer Conference, University of Colorado, Boulder, Colo. Sec'y, ASME, 29 W. 39th St., New York 18, N. Y.

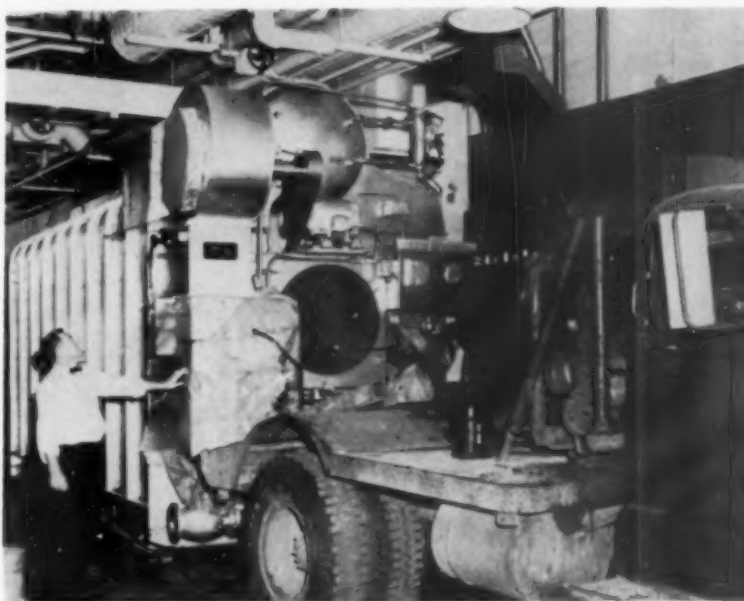
Sept. 24-27: ASME-AIEE National Power Conference, St. Francis Hotel, San Francisco, Calif. Sec'y, ASME, 29 W. 39th St., New York.

Sept. 24-27: ASME Petroleum Mechanical Engineering Conference Muehlebach Hotel, Kansas City, Mo. Sec'y, ASME, 29 W. 39th St., New York 18, N. Y.

Oct. 4-6: ASME Process Industries Conference, Shamrock Hilton Hotel, Houston, Texas, Sec'y ASME, 29 W. 39th St., New York 18, N. Y.

Oct. 9-11: 17th Annual National Electronics Conference & Exhibition, International Amphitheatre and Hotel Sherman, Chicago, Ill. John S. Powers, Exhibits Chm., 228 N. LaSalle St., Chicago 1.

Oct. 24-27: 1961 Conference & Exhibition, South Central Region, NACE, Shamrock Hotel, Houston, Texas. T. J. Hull, Exec. Sec'y, NACE, 1061 M&M Bldg., Houston.



Lone Star Brewing Co. Adds More Steam — Texas

The Power Department of the Lone Star Brewing Company of San Antonio, Texas, recently put into operation two all-new ultra-modern Keystone steam generators developed by Erie City Iron Works.

The new pressurized two-drum water tube packaged generators were delivered to the San Antonio brewery on boxcars completely assembled, hydrostatically tested and fully equipped, ready to be installed and worked.

The integrated steam generating plant has water cooled walls with tangent tubes in the furnace. The tangent tubes in the furnace, and outside walls and the steel jacketed insulation keep the heat loss down to a minimum. This insulating and protective jacket consists of three layers. The first layer is the welded steel casing over the outer row of tangent tubes. Next comes a thick layer of lightweight insulation covered with a bolted outer casing of heavy gauge steel.

In addition to giving the maximum in protection and insulation, this 3-ply casing is reported to have other worth-while advantages. Because the inner casing is always hot, combustion gases will not condense and corrode the casing. The bolted casing allows access to the insulation or tube bank without having to cut any unsightly patches.

American Plating Expansion — Okla.

The American Plating Company, 210 S. Shartel, Oklahoma City, and 411 Main St., Duncan, Okla., has purchased the franchise rights to the "Kanigen" chemically-deposited nickel process from General American Transportation Corp. of Chicago.

A new \$26,000 plant will be built adjoining the present location at Duncan. Equipment will cost \$75,000, exclusive of chemical supplies. A 100 hp boiler will be installed to heat the tanks for plating.

E. H. Hoover, company president, has been in the metal plating business in Oklahoma City for the past thirty years. Static Willson, vice-president and chief engineer, was formerly with Halliburton Oil Well Cementing Co. Everett Johnson, plant manager at Duncan, will also be manager of the new operation.

S. W. Public Service Installing G-E System

Southwestern Public Service Company, Amarillo, Texas, will use a General Electric Automatic Dispatching System to control six of its largest turbine-generators in its four-state distribution area. Installation of the G-E system is expected to be completed by the end of 1961. Cost will be close to \$100,000.

Southwestern's power plants tied

News of the South-Southwest — more power . . . more plants . . . more money

together by the system will include Plant X, three turbine-generators; Cunningham Station, one turbine-generator, and Nichols Station, two turbine-generators. Plant X and Nichols Station are located in Texas while Cunningham Station is in New Mexico.

The Automatic Dispatch System is a development of General Electric's Instrument Department, West Lynn, Mass.

Baker Industrial Trucks Opens Atlanta Branch

Baker Industrial Trucks Division of the Otis Elevator Company has opened an Atlanta branch office at 262 Rio Circle in suburban Decatur, Georgia. The new branch serves over 100 counties in northern and central Georgia including the cities of Atlanta, Decatur, Macon, Athens, Columbus, Albany, Rome, and Augusta.

An ultra-modern 16,000 sq ft building houses complete sales, service, and rental facilities. Handling sales of Baker Industrial Trucks and allied materials handling equipment in this area is a three-man force under the supervision of Marshall Dreitzler, branch manager.

A complete line of fork-lift and fixed platform, gas, LP gas, and electric industrial trucks is available from this branch. In addition to the regular line, the branch also sells the

"Traveloader," a unique side-loading vehicle for long, bulky, and highly selective load handling. A complete line of trucks also is offered on a rental basis.

A service and maintenance shop staffed by factory trained technicians is provided for all types of ma-



Mr. M. L. Dreitzler

terials handling equipment. Additional service is offered by mobile units completely equipped for maintenance of the customer's vehicle at his own plant or job site. Services such as lubrication, oil changing and minor repairs are available through use of these mobile units.

An inventory of over \$100,000 in parts will be on hand at all times at the Atlanta Branch for efficient and economical service to customers.

Crane Establishes New Service & Repair Plants

Crane Company, manufacturer of valves, plumbing, heating and air conditioning equipment, has announced the formation of a new Valve Servicing and Repair Division. Plants and offices throughout the country will expedite the overhauling and reconditioning of industrial valves and specialty piping machinery.

Crane service plants are now in operation in Chicago, Houston, and Los Angeles. While the new facilities are primarily set up for the repair of Crane valves, other brand-name valves can be handled.

Acme Industries Opens Birmingham Branch

Following the recent opening of Acme Industries' Greenville, Alabama plant, the company has opened a new Factory Branch Office at 2301 Ninth Ave., South, Birmingham. Acme manufactures air conditioning equipment. Martin A. Elf has been appointed sales engineer, with headquarters at the Birmingham office.

The company has also announced the appointment of Charley P. Walker, Jr., as sales engineer with headquarters in Montgomery.

(Continued on page 70)

Interior of Baker Industrial Trucks new Atlanta Branch Office, located at 262 Rio Circle in Decatur, Georgia. This view shows a complete line of trucks, gas and electric, stocked at the new facility for sales and rental to customers in the area.



Vogt

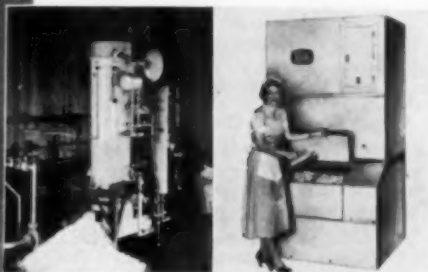
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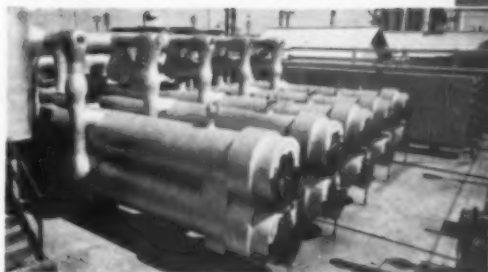
MORE REFRIGERATION TONNAGE AT LESS COST

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Our modern shops produce a wide variety of equipment from special metals and alloys to fight corrosion and product discoloration or contamination. Fabrication procedures insure that corrosion resistant properties of welds will match that of the materials used to construct the equipment.



PROCESS EQUIPMENT FOR EVERY SERVICE

Vogt constructs process equipment in wide variety to all Codes. Stills and towers, oil chillers, crystallizers, heat exchangers, molding machines, etc., serve in the manufacture of oils, greases, 100 octane gasoline, synthetic rubber, chemicals and related products around the world.



HIGH EFFICIENCY STEAM GENERATORS

Vogt steam generators are designed to give maximum rating in a minimum of space, with high efficiency and low maintenance expense. Bent tube and straight tube designs are available for solid, liquid or gaseous fuels to meet every power, process or heating requirement.



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INDUSTRY SPEAKS



There's a Lot of Loose Talk in Washington

ARTHUR H. MOTLEY, President of the Chamber of Commerce of the United States and publisher of *Parade* magazine, has called for major tax reform as the best way to help create jobs for those now unemployed and for the millions of new workers who will enter the labor force in the 1960's.

Mr. Motley said reform such as proposed in the Herlong-Baker Bill would put a premium on job-creating investments rather than "a premium on tax maneuvering and dodging."

He spoke at the annual dinner of the Miami-Dade County Chamber of Commerce.

"Savings plus investment make it possible to put a man to work," Mr. Motley said. High tax rates that limit investment hurt "the guy who has to pay up, but even more so, they hurt those who are unemployed, those who want jobs, have to have jobs to support their families." Industrial jobs require investments of \$10,000 to \$20,000 each, he said.

"Frankly, I hope some of you are mad about taxes. And not just mad this week and next, but mad clean through . . . enough to get to the point of wanting to do something about our federal tax structure.

"Why am I so 'het up' about tax reform? Well, let me tell you why.

"There's a lot of loose talk going on about what can be done to stimulate the economy. Washington, for example, is full of it. It seems everybody knows how to stimulate the economy. Why you could paper the walls of your home with the hundreds of bills now before Congress, each one of them designed to cure our economic what-ails-us!

"The question is: Are there any real remedies among all these economic painkillers? Frankly, not many. Yet the sad part isn't this so much, it's the fact that right at hand we have economic weapons that will help do the job . . . and we are neglecting them, not using them. Why? Largely because they aren't well enough understood.

"Take federal tax reform, for instance. Here's a means to lick unemployment, to create savings, to provide funds for investment. Here's a means to put people back on the payrolls . . . and the tax rolls.

Here's a means to truly build up our economy, push it ahead . . . shove it 'way out in front where it rightfully should be."

Tax reforms proposed in Herlong-Baker would not reduce total federal revenues, Mr. Motley said. He explained that the bill is designed so that rate cuts would be offset by the normal \$3 to \$4 billion annual growth in tax revenues. At the same time the tax savings would stimulate the economy and this, in turn, would produce more revenues.

Here are major features of the Herlong-Baker bill:

Over a five-year period, individual income tax rates would be compressed — the top rate from 91 to 47 per cent, the low rate from 20 to 15 per cent, the middle rates proportionately. Corporate rates would be compressed one per cent yearly down to 47 per cent.

The bill would reduce rates on estate and gift taxes, and provide a deferral of tax on transfers of capital from one private investment to another. "This should help with savings and investment . . . and thereby, with jobs," Mr. Motley said.

He said the bill would permit businesses to expand faster and keep plants in top condition through better tax depreciation treatment. "This means more and better jobs."

Pointing out that other countries have more favorable tax depreciation policies, he said: "In Western Germany, in Italy, in France and in Great Britain they have largely rebuilt their industry since World War II. And its new plant — streamlined, productive, built with the benefit of new technologies. The same is true in Japan. You may note our aid programs have helped with this rebuilding.

"These are allies, it is true. But they are also business competitors. Time was, a few years back, when we more or less had the field to ourselves in foreign trade. Now these countries compete with us, not only abroad, but right here at home.

"We must improve our industrial performance.

"Better depreciation treatment, through federal tax reform, will help to accomplish this purpose. We can then write off new equipment and replacement costs more quickly for tax purposes."



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TIMELY COMMENTS

Zero Accidents Hard to Achieve

FOR THE FIRST TIME in recorded history, every one of Du Pont's 120 plants and laboratories went a month (January) without a time-losing injury to any employee, thus reaching a goal which had eluded the company for years — only to have two people hurt in a home-office building which had been hailed nationally as probably the safest of its type in the world.

Then the next month, things reverted to form when there were two injuries on plants and more occurred in March. Next an employee developed medical complications which were traced back to an accident on a plant in January, thus wiping off that record.

There was further irony in this sequence because some judicious prodding by Du Pont's top management seemed about to pay off and it may yet. Seeing the rate of injuries going up last year there was the simple question "What's being done about this?"

It's not that the rate is bad; it has been good enough to win many national honors, some of them many times. For the last decade it has been dwindling toward the vanishing point but never got there, not even a zero for a month, the first goal.

A measure of what employees did is that while they were mostly staying out of harm's way on the job the first two months, 330 were injured away from work; and even that is about twice as good as the public average.

Much trouble comes from a lot of little things and Du Pont has believed traditionally that it is management's job to "head them off at the pass" and see that all 90,000 employees leave the job unharmed every night.

Maybe we expect too much in trying for complete safety; but I don't think so, said J. Sharp Queener, manager of the Safety and Fire Protection Division. Sounding a bit frustrated, he said, "We know it must be possible to eliminate injuries entirely because last year 90 of our plants and laboratories did it." Even though Du Pont employees are about 15 times safer at work than away, "nobody should get hurt." But he rather grudgingly admitted that "as the rate goes

down, the job of improving it does become more difficult." The 1960 rate was 0.41 per million man-hours worked.

"All the pennants and plaques we keep getting and the national and world safety records our people have set and the paraphernalia they win as prizes don't mean much to the people who do get hurt," Mr. Queener added.

Last year there were 74 time-losing injuries and a third of them involved hands or fingers, mostly fingers. When equipment is at fault, it is frequently easy to take steps: one man hurt his fingers on burrs left on steel so the company started ordering deburred steel (at no extra cost).

But how do you keep a man from hitting his thumb with a hammer hard enough to become a statistic, or neglecting to duck under a pipe at the expense of his head, or leaving a cover off of whirling equipment into which another employee accidentally puts his fingers? Safety meetings, signs, slogans, prizes, and constant attention to detail have brought about the low rate but not complete elimination of injury.

An off-the-job program which has been in operation for several years apparently had the encouraging but unexpected result of decreasing injuries at work. On the principle that an employee hurts just as much from an injury at home as at work, and is just as likely to lose time from his job, the company passes along ideas to employees they can use away from work.

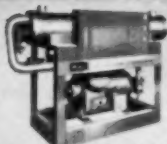
These are simple things: take the roller skates off the stairs, beware of lawn mowers, keep the butcher knife away from Junior, and the like. Surprisingly, it proved effective.

But having gotten into this, the company found some new food for thought in accident prevention: A crossing gate closed on one person's head. Another tried to go over a fence too fast when an angry hog chased him. Another came out second best trying to catch a falling cow. A zero accident record is hard to attain.

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Pkgd. Chillers 1½-250 tons



Room Conditioners 200-600 cfm



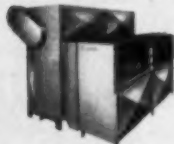
Cooling Towers 3-120 tons



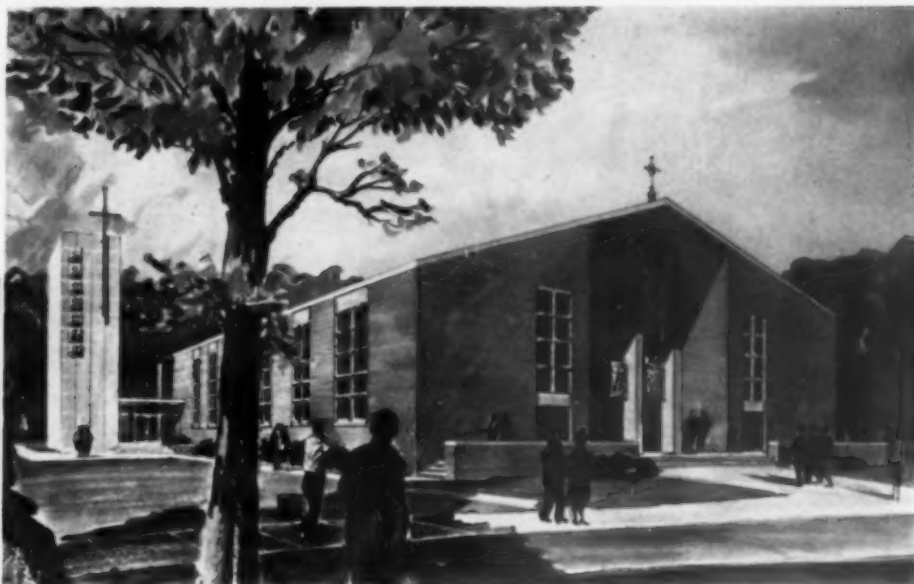
Pkgd. Air Conditioners 3-60 tons



Evap. Condensers 10-110 tons



Air Handlers 665-47,000 cfm



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View shows tremendous size of the new lumber storage building and vast area covered by the Lumber Division.

Master Plan Controls Construction Program for Arkansas Mill

Wood for Big Structural Elements

CROSSETT Lumber Company, a Division of The Crossett Company of Crossett, Arkansas, recently took a long range look at its future and decided that the prospects were quite promising. The expanding economy and population of the United States indicates an increasing demand for finished forest products such as Crossett Lumber Company produces.

A significant phase of the expansion and improvement program was completed in 1960, and included (1) replacement of the log barker with a new and larger barker,

By **CHARLES A. LAWLER**, Partner, and
GEORGE G. JARBOE, Project Engineer
H. E. BOVAY, Jr., Consulting Engineers
Houston, Texas

(2) addition of four dry kilns for 40% more drying capacity, and (3) a rough dry lumber storage building with overhead crane, for an added 3½ million board feet working storage capacity.

All parts of this phase of the modernization program were laid out and planned to fit a ten-year master plan prepared by H. E. Bovay, Jr., Consulting Engineers

and Crossett before detailed engineering planning was undertaken. Coincident with the overall planning, a resurvey of the forests was underway, and upon completion the survey indicated a faster rate of yield than had been expected previously.

The improvements recently completed were undertaken to meet the requirements for increased

production programmed in the master plan and to take advantage of the greater forestry yields.

The Crossett plant includes two sawmills, green sorting facilities, a battery of 14 dry kilns, cooling and storage sheds, stacking, unstacking, and dry sorting equipment, and planing mill. An extensive hardwood drying yard and a hardwood flooring plant, together with several by-product operations, including production of pulp chips from sawmill wastes, are also important parts of Crossett's operations.

Barker and Log Handling

A new Nicholson 34" Accumatic Roto Barker was installed to replace the existing 30" barker, since due to its age maintenance costs were high, and with the higher cutting rates, it was felt that the older barker would not be reliable. The new barker will handle logs from 4" up to 34" in diameter and lengths from 8' up, at a maximum speed of 130 feet per minute.

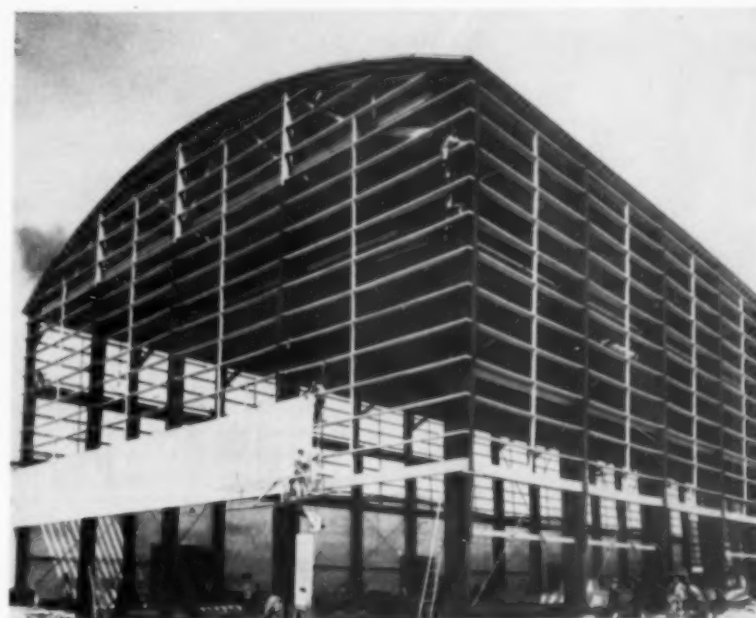
It was first thought that the new machine would fit the existing barker foundation with only minor revision; however, extensive modifications to the original concrete would have been necessary. For this reason, and to enable the new barker installation to be made with minimum downtime, a new foundation was built in line with the old one. This permitted the installation of the new barker and removal of the other with minimum lost production.

New sections of roll case and log chain were installed to accommodate the new barker in the log haul, and the old log unloader arms and kickers were replaced with new cradle unloaders to transfer logs from the haul to the log decks leading to the two sawmills.

Increased Drying Capacity

Four new steam heated cross-circulation overhead fan dry kilns with additional green storage tracks and cooling shed were built to the east of the 10 existing dry kilns. The new kilns are each 106' long by 27' wide, with double tracks. Mechanical and control equipment was furnished by Moore Dry Kiln Co. of Jacksonville, Florida.

The kilns are designed to handle



New rough dry storage crane building with workmen installing siding. Note unusual column sections.

lumber loads of 8' 0" by 11' 6", and the door openings are 10' 4" wide by 12' 0" high. Kiln car tracks are carried by reinforced concrete beams supported on dug spread footings spaced at 8' in the kilns and at 15' in the cooling sheds. The building structure proper is supported on spread footings.

The kilns are of reinforced concrete except for the longitudinal brick walls which have reinforced concrete pilasters, and the beams for the roof and fan decks which are steel, coated with asphaltic preparation to resist deterioration in the kiln vapors. The roof for the kilns is poured reinforced vermiculite concrete with built-up roofing on top. The control room is frame construction on steel and concrete floor and supporting columns.

The new cooling shed is built of solid sawn pine timbers and columns with wood roof deck and built-up roof. Spread footings of concrete support the building.

Green storage tracks are supported on compacted fill and concrete track ribbons. These were built at a significant savings compared to spread footings and track beam construction often used for green storage areas ahead of dry kilns, since soil conditions were

poor and suitable fill material was available.

The new kilns offer additional drying capacity of approximately 28 million board feet per year. The four additional kilns make a total of 14 similar kilns, the 10 older kilns having been operated continually since installation in 1948 (8 kilns) and 1952 (2 kilns). The total drying capacity is now approximately 100 million FBM annually and takes care of recent production increases of 8,000,000 FBM in 1959, 10,000,000 FBM in 1960, and expected further increases in the period until 1965.

Crossett normally dries its pine lumber to 8% - 12% moisture content, and hardwood is brought down to approximately 8% after being partially dried on the air drying yard. Average drying time in the kilns varies from 84 hours for 4/4 pine up to 102 hours for 8/4 pine. 4/4 hardwood averages 96 hours.

One of the four new kilns is especially equipped for efficient drying of Southern Yellow Pine and the other three are designed for hardwood drying. The project also included improvement of four of the ten older kilns by addition of finned steam radiation pipe to supply more heat for faster drying of



Interior view of rough storage building shows 10 ton capacity 100' span lumber handling crane.

pine, which species predominates Crossett's production. (Crossett produces 80% Southern Yellow Pine and 20% mixed hardwoods, mostly oak.) Current annual production is approximately 90 million FBM.

The kilns, cooling shed, and

green storage track construction was completed late in 1959.

Rannie Terral Contractors of Farmerville, Louisiana, handled the general contract construction under terms of a lump sum contract agreement. Crossett handled part of the construction work with

Workman readies column for erection. Note columns already in place in background.



its own forces, including the green storage tracks, the extension of the green transfer track by approximately 120 feet, and the electrical wiring, lighting, and installation of temperature and humidity control equipment in the kilns and control room.

Rough Storage Building

The new rough dry lumber storage building was built to provide storage for the increased production and to streamline the lumber handling. Lumber is taken from the dry sorter chain, where it is sorted by length, thickness, width, and grade, and handled into and out of storage by crane. The increased storage capacity was necessary not only because of the increased production, but also it will release other space presently used for storage that is more suitable for other purposes outlined in the master plan.

Glue-Laminated Timber

The new rough dry storage building is unusual, since it is one of the few industrial buildings of its type and size, containing a high-speed crane, that is constructed of glue-laminated timber.

All lumber used in the new building was Arkansas Soft Pine furnished by Crossett. The building is 103' wide, 468' long, has an eave height of 55' and a crane rail elevation of 41' 6". The 100' span 10 ton P & H crane can travel along the building at speeds up to 600' per minute. Unit Structures, Inc., of Peshtigo, Wisconsin, furnished and erected the building to the specifications established by Bovay Engineers under a lump sum contract.

Design and details took full advantage of modern construction methods and techniques. For example, the columns were rigidly fixed at the base to reduce their size and cost. Wind loads and lateral crane loads are transmitted by the columns to the foundation without any additional transverse bracing.

An unusual column section resulted. The column cross-section varies from 30" in depth to a maximum of 48" in depth just below the 41' high crane beam. The width is a constant 9" throughout. This permitted the column to be built

up by laminating 2" x 10" lumber, varying the number of laminations to correspond to the necessary depth. All columns were pressure treated with 5 per cent pentachlorophenol solution to a retention of 8 lb per cubic foot after lamination.

The fixed column bases presented some foundation problems which were overcome by using drilled underreamed footings. Existing soil conditions required that these footings be about thirty feet deep and bell out to 10' diameter at the bottom. Foundations were drilled and poured by East Texas Foundation Drilling Company of Longview, Texas, under a lump sum contract.

The roof is supported on laminated bowstring trusses, which were assembled on the ground and erected in one piece. The lumber handling crane was set into position before the last truss was put in place. The roof deck is 2" wood decking covered by 4 ply built-up roofing. Siding is of corrugated galvanized iron, and a continuous band of translucent panels along each side of the building provides natural lighting. Roofing and siding contractor was Rannie Terral of Farmerville, Louisiana.

Due to the broad range in types of work, the immediate need for some of the facilities, and the fact that Crossett Lumber Company wanted to do a considerable amount of the construction work themselves, it was decided that separate bids would be taken for the various phases of the construction work, rather than have one general contractor for all of the work. Substantial savings resulted from this procedure although more than usual construction supervision and coordination by the Engineer and Owner were required.

The new building has space for a working inventory of 3½ million FBM and a maximum capacity of 6 million FBM. Provisions have been made for future extensions to the building to meet the increased production requirements of the master plan.

The volume required for the working inventory is attained with lumber packages stacked four high, each package being 42" wide and 48" high. Maximum capacity is

figured with packages stacked seven high. Use of this extra capacity will require some extra handling and will be valuable to Crossett to take care of temporary peak inventories.

All new facilities are equipped with a dry pipe sprinkler tied into the plant to minimize the fire hazard. The Grinnell Company of Memphis, Tennessee was the contractor.

These improvements comprise an important step in an overall master plan for plant improvements over the coming years. This master plan makes it possible to fit improvements in with the existing plant as they are needed and to

allow for future developments and expansion in a logical order. Even before the completion of this work, Crossett was proceeding with another phase of the plan — the expansion of its log yard and log handling facilities. Through overall planning each step can work together with the others toward the common goal.

George G. Jarboe of the Bovay Consulting Engineers organization was project engineer for this program and H. R. Petty served as resident engineer. Eben H. Bailey, Sr., Chief Engineer for the Crossett Lumber Company, was coordinator for the Owner on all engineering and construction activities.

Pressure Testing Is Speeded in West Virginia Plant

Portable Pump Rig

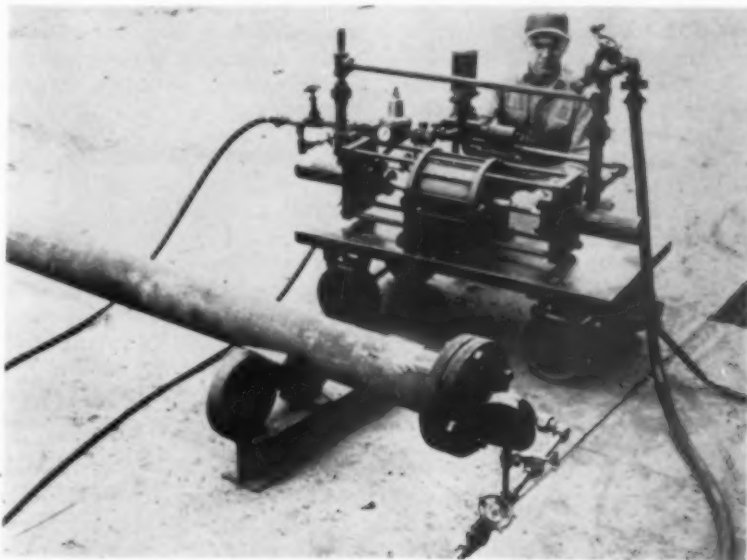
PRESSURE testing of process equipment at Union Carbide Chemicals Company is speeded with a portable hydraulic pump rig. Maintenance workers at the company's South Charleston, W. Va. plant designed the unit.

The rig consists of a horizontal air-driven hydraulic pump mounted on a rubber-tired cart. The 7330 psi pump, manufactured by the Aldrich Pump Company, operates on 90 psi plant air. Operation is quiet and virtually free from vibration.

The rig is used for pressure testing pipe, heat exchangers, tanks, coils and special pressure vessels after fabrication or repair. While much of the testing is done in the welding shop, the unit's portability enables the pump to be used at locations throughout the plant.

The company reports that the pump provides fast, efficient testing of equipment. In testing large capacity vessels particularly, the desired pressure is attained much faster than formerly.

Every six months the pump is cleaned and lubricated and foreign matter is removed from the valve seats.





**Fig. 1
This View
Shows Why
Resurfacing
Was Needed**

Hard Working Plant Floors

A FLOOR PROBLEM that made it exceedingly difficult to move materials handling vehicles has been solved at The Imperial Tobacco Co. Ltd., Durham, N. C., according to James Ramsey, factory manager.

Mastic had become so indented that vehicles with small wheel diameters could not easily be rolled. The vehicles, loaded with tobacco leaf, were weighted up to 1,000 pounds. Originally the wheels were 3½ in. diameter, 1½ in. face. They are now 4 in. diameter, 1½ in. face.

The weight factor was complicated by the fact that the building is used mainly during the harvest season when the South's heat is at its worst, and the heat at times

made the mastic very pliable.

In addition, in one area, the pliable mastic caused a redrying machine (peak temperature 220 F) to settle unevenly. This made the machine function improperly.

Two types of concrete resurfacing were tried before a third — successful — type was tested. The third type, the Kalman Floor Company's heavy-duty Absorption Process, has met all of Imperial's requirements.

The first section was installed four years ago in an area over which all of the company's incoming and outgoing tobacco travels. From 8 to 14 million pounds of tobacco is handled yearly. Additional areas will be done in the same manner, according to Mr. Ramsey.

Method of Resurfacing

The floor was resurfaced in the following manner:

First, the old mastic surface was removed with three 60-lb air-driven paving breakers. During the cutting operation, dust was minimized by keeping a constant spray of water on the tool points. The mastic was not too difficult to remove and it flaked off in large chunks in most places.

After the mastic was removed, the base slab had to be cut down to permit a minimum topping thickness of ¾" — the minimum thick-

ness at which the topping is installed. This chipping also scarified the concrete base slab in those areas. In other areas, scarifying machines cleaned off the base slab. Scarifying is necessary to prepare the base so the topping will bond to it.

Finally, the concrete topping was poured. The Kalman installation procedure is called the Absorption Process because initially about 5 gallons of water per sack of cement, including water content of the traprock and cement, is used to achieve maximum workability. After the mix has been screeded and workability is no longer a factor, absorption blankets and a drier material remove all but about 3.5 gallons of water.

This is to within .7 gallon of the amount of moisture which is needed to achieve complete hydration, and the mix at this point is so stiff that it will support the weight of a man without indentation. Hydration is the chemical process which takes place when cement and water are brought together. The result is the hardened paste which holds the floor together.

This procedure imparts a natural densification to the topping during the water removal process and removes virtually all excess water, which would cause voids or weak spots in the finished floor.

The topping is then further den-

sified with mechanical float and trowel machines. Then hand troweling closes all surface pores and imparts a built-in shine to the surface. Finally, the floor is covered with a waterproof paper for up to 14 days. During this time water is periodically flushed under the paper to make certain that the surface does not dry out. This water curing is to permit hydration of the cement to continue.

Results

The resulting topping reaches a strength of 8000 to 10,000 psi in compressive strength and an abrasion resistance of 19.0 to 19.6 on the Dorry Hardness Test (out of a possible 20.0).



Fig. 2

Initial step in the Absorption Process is shown here as the absorption blanket is placed on top of the freshly poured and screeded concrete mix. Note how wet the mix is.

Fig. 3

Drier material is then spread evenly over the absorption blankets and left there for a time period which varies depending on a number of factors. Removal is based on job superintendent's judgment.

Fig. 4

When absorption blanket and drier material are removed, sufficient water has been removed from the mix, so that it now supports weight of a man without indentation. The topping is then further densified with mechanical float and troweling machines before final moist curing under waterproof paper.





LEFT — Heavily traveled area shows clarity and good house-keeping appearance imparted by Urethane floor finish.

RIGHT — Finished and unfinished areas in close proximity give dramatic comparison of immediate results achieved.



How a North Carolina Mill Found Right Finish For Wood Floors

Urethane Finish Adopted After Tests

BEFORE URETHANE floor finishing at Chatham, the results obtained from other floor surfaces were not worth the cost, according to Claude B. Hart, chief engineer, Chatham Mfg. Co. Urethane has made the finishing of wood floors worth-while, and the results obtained are evident in this prominent mill.

Chatham started using Urethane floor finish in June, 1959, and the first area treated was in the card room where the wood floor was oil soaked and dirty. The area had lost the benefit of good housekeeping appearance and light. A floor scrubbing machine was purchased to scrub grease off floors. Excellent results were achieved with this machine which is called "Convertomatic." (Supplied by Puritan.)

After scrubbing, floors were sanded. Grease and gunk on floor fouled the sanding machine in trials before scrubbing. The floor scrubber paid for itself in sandpaper savings alone, records show.

The Urethane finish was applied with a floor applicator about 24" long and 2" wide with fur type surface. Allowed to dry for eight hours, the finish gave good coverage and adhered even over small amounts of oil. Notably, Urethane dries faster in high humidity, and the floors were more lustrous, clearer, easier to keep free of lint, and more durable than anything ever used in this plant before.

The mill has not refinished any areas covered with the new finish. About 390,000 sq ft of wood floor space at this plant requires floor

finishing, and at the time of this report, about 290,000 sq ft are finished with Urethane. Maple flooring is used in all areas except where concrete is used. There is no significant difference in cost of refinishing wood floors when using Urethane as compared with any other finish, because materials represent only a small part of the cost, being less than 5 per cent of the overall cost of the job, according to officials at Chatham.

Expected life of the finish where there is heavy traffic is 1½ years; in areas of light traffic anticipated life is indefinite.

Test samples were tried in a main traffic alley, and 10 ft areas were finished with each kind of finish tested. Urethane looked like new after two months while others

Another heavily traveled area shows excellent coverage over water stained floor as well as protection from water in future.

had become dull and showed definite signs of breaking down. The results appeared obvious after the first three or four days.

The Urethane finish has been used on many work table tops, and this has actually saved recovering the tables used for folding blankets. Tops of these tables have to present a smooth surface with good wear characteristics.

DuPont oil-free Urethane was used in this instance.

There is no odor after the finish dries, and it can be cleaned with soap and water. It is hard, oil resistant, bonds well, and is easy to clean. However, more care must be exercised in applying Urethane, and more spreading is required than on many finishes. It takes three hours between coats in high humidity, and six hours are re-



quired for drying in low humidity. The procedure requires application of one coat, buff, then put on another coat. Buffing is done with fine-grain sandpaper.

Results have been so gratifying at Chatham that all wood floors are to be finished with Urethane, according to Claude Hart, chief engineer.

Instructions That Can Be Understood

THE FIRST STEP toward minimum maintenance is correct installation. This fact is recognized by Fischer & Porter Co. — And they are doing something about it by providing clear instructions and all necessary supplies with their electronic flowmeters.

The installation kit illustrated here is supplied with each meter. Installation procedures are clearly stated in an illustrated "Warranty Tag Booklet" and the kit contains virtually all hardware necessary to the installation of the meter, even down to the talc for dusting the flanges when necessary.





Fig. 1 — Two instruments for dead circuit testing: megohmmeter and volt-ohmmeter.

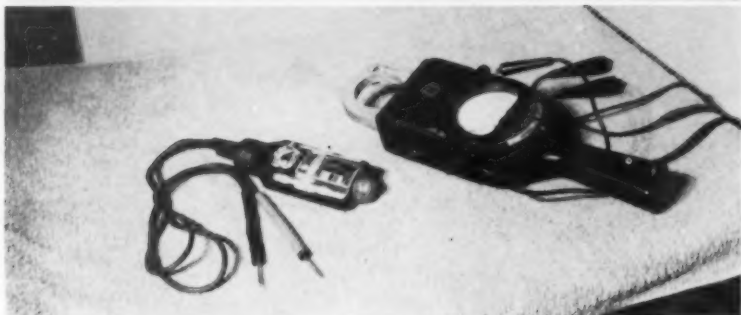


Fig. 2 — Two instruments for live circuit testing: solenoid circuit tester and volt-ammeter.

A Simple Electrical Testing Program Can Help You

Keep Ahead of Controller Failures

THE TESTING of the electrical devices and equipment that control the production machinery is too often neglected. Ever have an electric motor burn out, because the overload relay failed to trip, then feel like kicking yourself for not testing that overload relay last week? Casual inspection may reveal some defects and prevent breakdowns, but there is a real need for instrument testing of control equipment.

In helping several industrials to set up electrical procedures, for both preventive maintenance and emergencies, we have followed a systematic method of testing. A part of this system is devoted to testing the controllers, and this phase of the work has revealed many repair needs before breakdown. Also this controller testing has shortened down-time in many cases of actual breakdown.

We try to follow a plan that can

By **NED THOMPSON**

Electrical Engineer
Thompson Electric Co.
Texarkana, Texas

be understood easily by maintenance men, even in small factories. We realize also that it is not usually desirable for the smaller plants to invest in expensive test equipment such as high-potential insulation testers, large dynamometers, high-frequency coil-testers, or high-current load-packs.

We have found that a few simple, reliable instruments can accomplish most of the testing necessary for maintaining the control equipment in the average industrial plant. Of course, some devices such as electronic speed controls for steel rolling mills, or industrial electronic computers, would require a Cathode-ray oscil-

loscope, and other electronic instruments. But this type plant would usually employ a technician versed in operation of this equipment.

The average plant in this Texas-Arkansas border area succeeds quite well with instruments such as the following:

1. Megohmmeter, in the range of 50 megohms; and we prefer the 500 volt, d-c, hand-crank generator type.

2. Clamp-On Volt-Ammeter, a-c ampere ranges of 15-150-600 amps., a-c voltage ranges of approx. 50-150-600 volts. We only require that it be reliable, of good quality, in the sensitivity range of 1000 ohms per volt.

3. A-C — D-C Volt-Ohmmeter battery-powered, of excellent quality (1000 ohms per volt), volt ranges 3-30-300-600, ohm range 10-100-1000-10,000.

4. Circuit-Tester, of the sole-

noid-coil type, a-c — d-c, 600 volts max., with polarity indicator.

With these instruments, the mechanic is equipped to maintain the ordinary electrical controllers; also to analyze breakdown trouble when the need arises. He is equipped for dead-circuit testing, with the self-contained volt-ohmmeter, and the megohmmeter. He is equipped for energized, or hot-circuit testing, with the clamp-on volt-ammeter, the self-contained volt-ohmmeter, and the circuit-tester. He can bench-test repair jobs, as well as new installations.

In preventive maintenance, with a properly-kept card-record, he is equipped for comparative meter readings that will foretell faults about to occur in control devices.

Motor Controls

Magnetic starters and contactors are probably the most numerous of the controllers present in industrial plants. A combination data-card should be tied to each starter, covering important readings vital to maintenance of the starter and the motor. A typical card is shown in an accompanying illustration. In some cases, such as larger mill motors, we even recommend lettering some of this data on the starter enclosure. Items such as: normal load amps., normal load volts, normal megger reading at load terminals of starter, and normal load speed should be recorded.

In testing amperes load at load terminals of a starter, readings should be taken of all three phases, for several reasons. First, the readings can vary according to supply-voltage between phases: usual procedure is to average the phase readings. Second, the readings can vary, due to 2-wire solenoid valves, 2-wire magnetic brakes, etc., being wired to motor terminals. Third, loose joints or partially shorted coils can cause excessive load-current without affecting all phases.

It follows that if readings are compared with previous readings, electrical faults can be caught in their beginning, before failure of motor or wiring.

Overload Devices

A vital part of the magnetic starter is the overload tripping mechanism. There are various

types of overload relays in use. In the thermal overload relays, there are two or more different tripping elements in wide use, the bi-metal heater element, the melting alloy heater, and others. This type relay depends upon temperature rise of the heater element from increased current drawn by the motor, or other load. In other words, the overload heater element is in series with the load, and the amount of amperage drawn affects the temperature of the element.

In the bi-metal relays, as the temperature increases, the metal strip curves, or bends, tripping the relay at a preset point in the curve. Thermal overload relays are made in both automatic reset, and manual reset types.

In the melting alloy type relay, as the temperature increases, a tiny pot of soft metal alloy melts. Usually a small shaft is held by this alloy, until the alloy melts. This allows the shaft, with spring tension against it, to rotate slightly, tripping the relay contact.

Another type of overload relay is the magnetic overload relay. This consists of a solenoid coil through which the load current flows, and a movable iron core, or plunger, within the coil. Attached to the bottom of this core is a stem and piston sliding in a dashpot filled with fluid. This provides an inverse time limit overload protec-

tion, by the slow movement of the piston in the fluid, when starting a motor. This allows time for motor starting; but in running operation, if the load becomes excessive above a preset point, the magnetic pull on the core trips the relay contact.

The load-test on a magnetic starter in normal operation can be the principal test necessary to indicate many conditions at any particular production machine. You have no doubt seen starters, with proper heater elements, still allow a motor to burn out from overload, yet the relays never tripped. A small mechanical defect in the tripping contact can cause this occurrence, even to the point of burning the heater element completely in two, yet not tripping.

Building a Load-Tester

It is possible to buy an expensive load-pack, to actually put artificial load-current through a relay for testing, but for the small industrial plant, with perhaps 100 or more thermal overload relays, this equipment may cost too much. There is, however, an inexpensive method that can be devised to give fairly accurate results in this test, at least in the smaller and more commonly used starters. It is used on a dead-circuit test at the magnetic starter.

Figure 3 shows this simple overload relay load-tester. It consists



Fig. 3 — A simple load tester for overload relays. Its use is described in the text.

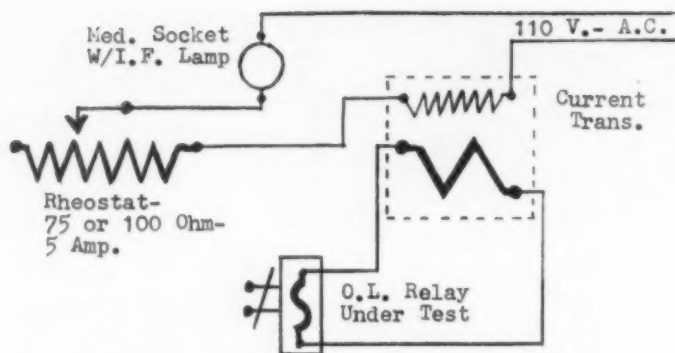


Fig. 4 — Diagram of the load tester shown above.

of the following inexpensive components, some of which may be in your storeroom:

1. A used current-transformer, doughnut type, 200 to 5 amperes, about 25 volt-amps., molded type.
2. Porcelain standard-base lamp socket, or cleat receptacle.
3. Rheostat, or porcelain-type adjustable resistor, 50 ohm, 500 watts, 5 amps.
4. Three 120 volt standard filament light bulbs: 50 watt, 100 watt, and 300 watt. Also one 750 watt cone-type heating element, and two test leads of extra-flexible lead wire size #8, each six feet long, with 50 amp. test-clips on BOTH ends.

Figure 4 shows the connection diagram of this load-tester. You will note that the 5-ampere output side of the current-transformer is here used as the input, or primary side. A 110 volt outlet is necessary to supply current to the load-tester, and the supply feeds the current-transformer through the rheostat, and one of the light bulbs in series. One of the test-leads can be looped several times through the hole of the current-transformer, to serve as the secondary, or tripping-current, to be applied to the relay block of the starter.

It can readily be seen that by using the combination input of different size lamps, along with adjustments of the rheostat, it is possible to get almost stepless load-test amperage, especially in the smaller, or medium starters. The current would be applied, through ONE overload device at a time, by clamping the test-clips at each side of the relay element. The clamp-on

volt-ammeter could be used to read the amperage being fed through the relay, and the tripping current set at the usual 25% above motor nameplate rating, or closer.

It will be found that the number of loops, taken through the hole of

the transformer, will govern the output capacity. For instance, eight turns with the test-leads through the hole will give excellent sustained test amperage of, say, 14 amps., or any amperage below 15.

This improvised load-pack will be found suitable for testing other devices, including the smaller range of circuit-breakers. Care should be taken to observe ampere readings during test, to adjust for any line fluctuations.

Insulation Testing

In addition to load-testing the starter, another dead-circuit test would be the megger test. This would show the condition of the holding-coil insulation, and the condition of motor windings and wiring insulation, by a Megger test from these various terminals to ground, and to the starter frame. These Megger readings should be

Fig. 5 — Testing controller for wound rotor motor in a hard-wood mill.



compared to the next previous readings.

We consider the following readings to be low enough to remove, at once, the holding-coil or motor stator for baking, reinsulating, or repair: 110 or 220 volt equipment, 500,000 ohms; 440/550 volt equipment, 1,000,000 ohms; 2300 volt equipment, 2 megohms; 4260 volt equipment, 4 megohms.

A close visual examination of controllers can often reveal defects that meter testing cannot reveal. Defects such as cracked insulator supports, crooked contact holders, small objects or chips between the contacts, etc. An important item to check, is the overtravel of contact springs. Insufficient overtravel usually means that the contacts are worn considerably, and may need replacing.

Control Relays

Magnetic Control relays serve many functions in industrial electrical control. They are furnished in many different styles and forms, and sizes from miniature to 100 amp plus. And from single pole to 32 pole plus.

Principally, the magnetic relay is defined as a control circuit device used for switching a supply of current, by use of separate electrical circuit or circuits, and for sequencing and interlocking circuits.

The usual applications in production machinery are to control loads from small current-switching devices, such as telemetering contacts, liquid-level signals, etc.

In testing magnetic relays, it is important to note any difference between operating-coil voltage supply, and contact voltage supply. If a solenoid-type tester were to be placed across contact-to-coil terminals, it might impose 220 volts a-c on the circuit. Obviously this would be too much for a very delicate signal circuit for telemeter operation of the relay coil. The battery operated volt-ohmmeter can usually be placed in use for continuity tests of such circuits, in a dead-circuit test.

Solenoid Type Tester

However, the solenoid-type tester certainly does have its place, in testing the ordinary magnetic re-

ELECTRICAL TEST CARD -- NORMAL DATA	
DATE _____	MACHINE _____
AMPS., MOTOR ONLY _____	AMPS., LOADED _____
AMPS., MACH. IDLE _____	VOLTS, LOADED _____
VOLTS, MOTOR OFF _____	MEGGER TEST _____
P.E. BEARING NO. _____	RPM, MOTOR, LOADED _____
O.P.E. " NO. _____	O.L. HEATER NO. _____
THOMPSON ELECTRIC CO., TEXARKANA, TEXAS	

Fig. 6 — Data card showing important readings.

lay. The most common relay used is the type with 110 volt control-circuit, operating 220 or 440 volt equipment. Here the coil-and-core type tester is preferable to the test-light, because many times a fuse can be blown and a small test-light, such as neon test-light, will still light through ground or control-coil. A sensitive volt-meter may also indicate continuity, when actually it is being read through control components, or ground.

The solenoid-type, or coil-and-core type tester actually consumes several watts of power, and requires some supply current to pull the core, or plunger, to an indication of continuity. A volt-meter, on the other hand, can indicate continuity through thousands of ohms resistance. So each test instrument has its own peculiar place in the maintenance electrician's set of test equipment.

Adjustable Overload Relays

The magnetic overload relay is in use where adjustable time-limit tripping is required. This protection is needed in many time-variances, from instantaneous-tripping to three-second delay, or more. Also they are available in several styles: dash-pot type, coil-and-core type, induction-thermal type, and coil-plunger type — for both a-c and d-c current.

Instantaneous tripping would be required in such cases as wood-working machinery, where a jammed condition of material in the machine would cause sudden high current. This relay must drop out the feed motor instantly to avoid damage to the machine.

Time-delay tripping is desirable in cases where overloads of short duration would not be damaging to

equipment, such as hammer-mills. The magnetic dash-pot relay is used for this purpose, with the plunger adjustable for varying lift of the relay coil.

In testing these relays, continuity through the tripping contacts is an important maintenance test, and the physical movement of contacts and plunger should be checked. The Load-Pack described earlier in this article can be used to test the amount of current necessary to trip any of these magnetic overload relays. Also the time-span adjustments can be made by using this Load-Pack.

Sequence Controls

Sequence controls and timing devices can be tested in both the dead-circuit and energized condition. For routine maintenance, the dead-circuit tests should include megger test, ohmmeter test on coils, and continuity test. The dead-circuit method for testing sequence controls will serve quite as effectively as an energized test. For testing and adjusting timing devices, supply voltage can be used for complete on-the-line settings, by disconnecting the load circuit from the timing device.

Large Motor Controllers

In testing controllers for slipping and wound-rotor motors, see Fig. 5, the routine maintenance test should include energized tests in normal operation, as well as dead-circuit tests for data and future reference in case of trouble. These motors are usually of large size, and more detailed data should be kept than in some smaller motor drives. That is, items such as normal operating load amperes on phases A-B-C, load voltages

across phases and rotor amperage at different steps of starting. See Figure 6.

The control grids, or resistors, are usually very low resistance for these motors. However, a dead-circuit test can be made with the drum controller in off-position. Even though an ohmmeter reading here would be in the nature of one ohm for each bank, this should be recorded for future reference. A

loose connection later may cause this reading, at the same terminals, to read ten ohms, or more.

Testing this type control is very necessary in a new installation. Megger readings, load readings and ohmmeter readings can be valuable from the very first operation for reference purposes.

Many specialty controls, other than those mentioned in this article, are to be found throughout

industry. Electronic controllers, multi-speed controls, magnetic amplifier controls, static sequence controls, etc. Many of the techniques of testing described here can also be utilized for those special controllers. But for all-around testing, if the above techniques are developed as routine, they will give the workman self-assurance and confidence in his ability to maintain electrical equipment.

A Brief Report

Digital Computer Performance in Power Plants

THE LOUISIANA Power and Light

Company, three years ago, ordered a digital computer system for their Sterlington Station to monitor selected points for correct operation; to alarm if out of limits; and to furnish operating and historical data for future control. The Control Systems Division of Daystrom, Incorporated, supplied the equipment.

The installation was described in considerable detail in the August, 1958 issue of Southern Power and Industry.

Daystrom guaranteed system operation 99 per cent of the time over a six month period to be mutually agreed upon. One of the factors determining the start of the guarantee run was that since

this was the forerunner of an automatic system, many changes were made after installation to find the most significant information points for control purposes.

All was in readiness for the "guarantee run" in July, 1959, and on January 12, 1960, records indicated that the system exceeded the guarantee by .75 per cent, being available 99.75 per cent of the time.

Since that time the system has only been off line very little, resulting in an availability factor of almost 100 per cent.

From a safety standpoint the system made several important contributions. D. L. Aswell, Plant Superintendent, has stated that during its operation the system has successfully warned the operators of abnormal conditions such as:

a. High temperature on boiler feed pump motor bearing as a result of oil cooler plugging.

b. High superheater tube metal temperature caused by adjustments made on the burner air directional vanes.

c. High seal water temperature on instrument air compressor and vacuum pump that developed when cooling water was shut off.

d. Computed turbine steam and metal temperature differentials approaching the accepted limits caused by too rapid startup or too slow startup.

In several other instances the system has permitted the operator

to check various temperatures that were suspected of being in trouble without leaving the control board. Also it provided stator oil temperature information at the board for remote manual control while normal board instrumentation was out of service.

Experiences with electronic monitoring and control systems indicate other advantages such as: 1. Reduction of auxiliary equipment power needs; 2. Provisions for high quality manpower output through elimination of routine tasks; 3. Increase of a unit's thermal operating efficiency; 4. Immediate furnishing of operational data while it is still of use for optimizing or correcting deviations; 5. Protection against boiler flame out; and 6. Minimum downtime through accurate startup and shutdown procedures.

To increase further maximum efficiency, the Louisiana Power and Light Company decided to close control loops on stator oil temperature, lube oil temperature, and hydrogen temperature. The stator oil temperature varies slowly and is therefore easily overcontrolled. By programming a delay, the computer can be made to maintain the temperature closer than a human.

These findings, coupled with a progressive attitude, led LP&L to be the first to contract for a fully-automated power station (SPI, Aug. 60, P. 40).

From startup to shutdown, Louisiana Power and Light's "Little Gypsy" station at La Place, Louisiana, will be computer-controlled to furnish optimal efficiency, maximum safety, and low cost maintenance.



MANAGEMENT CLINIC

Conducted by ROBERT H. EMERICK, North Charleston, S. C.



What Scale for Disciplinary Practices?

Question

WE ARE PLANNING to overhaul our disciplinary practices to obtain what we hope will be a truly equitable relationship between offenses and their penalties.

Is there any more or less standard scale available against which our projected estimate of values can be matched?

Another question, if we post our schedule on the plant bulletin boards, would this be considered adequate notice to employees, or should we put in the hands of each a small booklet of the revised rules, offenses and penalties?

Suggestions

A STANDARD SCHEDULE on disciplinary penalties is not generally practical, for the reason that the importance of an offense varies from industry to industry and from plant to plant. For example, sleeping on the job may bring only a warning if no collateral harm can result, whereas on-the-spot discharge is common if such sleeping causes a loss of product, a failure of machinery, or endangers the limbs and lives of other employees.

The following table, while far from complete, does indicate what we might call an average valuation of common offenses and their penalties as observed in numerous plants, including some industrial activities of the U. S. Government:

Offense	1st Time	2nd Time	Next	Reckoning Period
Walking off the job	Warning	5 Days Susp.	"	6 Months
Tardiness	Warning	1 Day Susp.	2 Days	1 Year
Careless workmanship	Warning	5 Days Susp.	"	1 Year
Disobeying orders	Min. 1 Day	10 Days Susp.	"	1 Year
Gambling on premises	5 Days	Discharge	—	1 Year
Fighting, horseplay, etc.	Warning	10 Days Susp.	Discharge	1 Year
Intoxication	1 Day	15 Days Susp.	Discharge	1 Year
Sleeping on duty	Warning to Discharge	Discharge	—	2 Years
Unauthorized smoking	Warning	10 Days	Discharge	2 Years
Theft	15 Days or Discharge	Discharge	—	No limit
Abusing superior	15 Days	Discharge	—	2 Years
Falsifying facts	Warning or Discharge	Discharge	—	No limit

*Calls for executive decision, whether more suspension or discharge.

Answering Question No. 2, we recommend promulgating the information by the personal booklet system, since by this means every employee is provided with his personal copy and can't plead he was uninformed when he infracts the rules. In numerous cases, arbitrators have found for the grievant in disciplinary disputes when the effectiveness of rules posting could not be proved by the company.

FLEXIBLE CONNECTORS

Courtesy, Allied Metal Hose Company

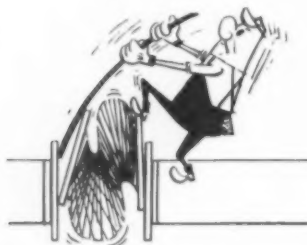
A FLEXIBLE metal pipe connector

(or flexible hose) is a relatively expensive, specialized part of your piping system. Fabricated of thin-wall tubing, it cannot take as much abuse as pipe of the same nominal diameter. The connectors are designed to do a specific job, and will give excellent service if they are installed properly. Carelessness and lack of foresight have proven costly in many jobs.

Based on 20 years of engineering, fabricating, and servicing a few million flexible connectors, Allied Metal Hose Company has found that the following eight installation hints will avoid most common failures.

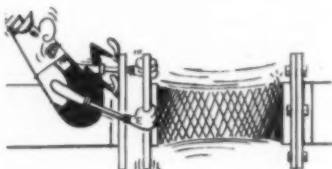
Although the cartoons are presented in humorous form, they carry a serious message: install it right, if you want it to work right! Read the manufacturer's literature; follow his instructions. You'll be rewarded by many years of trouble-free service from your flexible connectors.

DON'T COMPRESS a flexible connector to make it fit! Installing it under compression stresses corrugated element, slackens braid pressure-restrainer, reduces further compressive movement, and generally results in early failure.



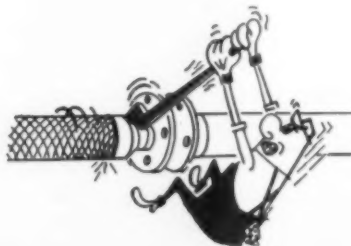
DO be sure to install it at exact normal free length as supplied. If connector is too long, shorten piping.

DON'T STRETCH connector to fit a gap longer than its factory-furnished length. Stretching places excessive residual stresses on braid and fittings. Result? Early rupture.



DO measure carefully to be sure connecting piping is cut to exact length.

DON'T FORCE-ROTATE one end of connector to match bolt holes in mating flange. This sets up residual torque-stress in connector, which causes cracking of corrugations or fitting joint. A flexible connector absorbs vibration, or slow movement perpendicular to its axis. It is NOT capable of withstanding torque.



DO be sure all bolt holes are perfectly lined up before welding pipe flange into place. Best insurance is use of one floating flange, to ease matching of bolt holes, speed up job.

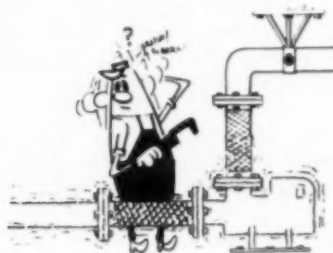
DON'T IMPOSE TORQUE on connector when making up fittings, and don't use a wrench on the ferrule or on the braid. Where a hex end is provided, use it. If not, use the wrench on the fitting length provided. Always use two wrenches, to keep the hose from being torqued as the joint is made up. See point 4.



Don't let welding sparks hit the braid; they may burn some of the braid strands. Protect braid with asbestos cloth or place other non-flammable material in front of it when piping must be welded very close near-by.

DON'T FAIL TO ANCHOR.

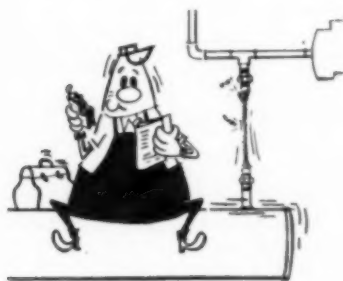
Anchor piping close to flexible connector, at end opposite source of vibration. If not, hose will transmit all vibration to pipe line, may even amplify it.



Anchor flexible metal hose at the piping end, never at the equipment end. If hose is not securely anchored, it will transmit all vibration to the piping system. Not only that, it will often act like a spring and actually amplify the vibrations. Whenever possible, install flexible connector to pump, compressor, or other vibrating equipment — before valves, pipe line, fittings — so that most vibration is absorbed and isolated instead of being transmitted.

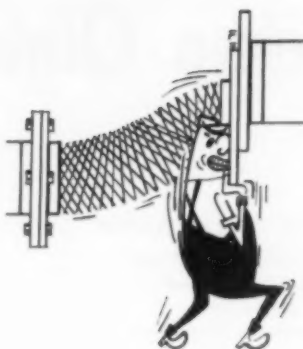
DON'T LET HOSE support any

weight except its own. Its light wall was designed to contain internal pressure, but not to carry external loads. Extra weight will stress and stretch it.



DO use hangers on all adjacent piping. Install hangers before installing hose, to be certain weight of pipe is on hangers.

DON'T FORCE HOSE into too much lateral offset. This puts it under great strain. Also, it cannot then handle any movement of any kind. Avoid excessive force.



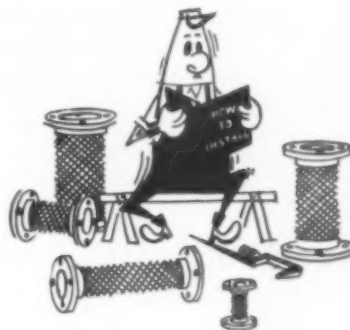
DO check manufacturer's literature and installation manual, and do not exceed maximum permissible offset. For large offsets, manufacturer can furnish factory-prebent hose units.

DON'T BEND HOSE sharply near fittings. Fitting end or flange face must always remain perfectly



perpendicular to axis of hose. If piping meets at an angle, install hose with a shallow curve along its entire length, leaving small straight section at each end. This kind of installation generally requires a longer hose. Consult the manufacturer.

Do Read the Instruction Book



Another Job For Polyester

FERRIC SULFATE (Ferri-Floc) is one of many industrial chemicals manufactured by our company. It is a superior coagulant widely used in both municipal and industrial water or waste treatment plants. It is corrosive to mild iron and steel, but is easily handled by plastic, rubber, lead, crockery or stainless steel.

When piping or solution pots of one of the above materials are not on hand, delays can be experienced.

One of our customers circumvented this difficulty by coating mild iron with Polyester Resin, the same as used to patch plastic boats. It is generally available at hardware and sporting goods stores. He reports that the pigmented-polyester is more desirable than the clear since it is easy to see where the coating has been applied.

By **BRANNON H. WILDER**

Tennessee Corp., Atlanta, Ga.

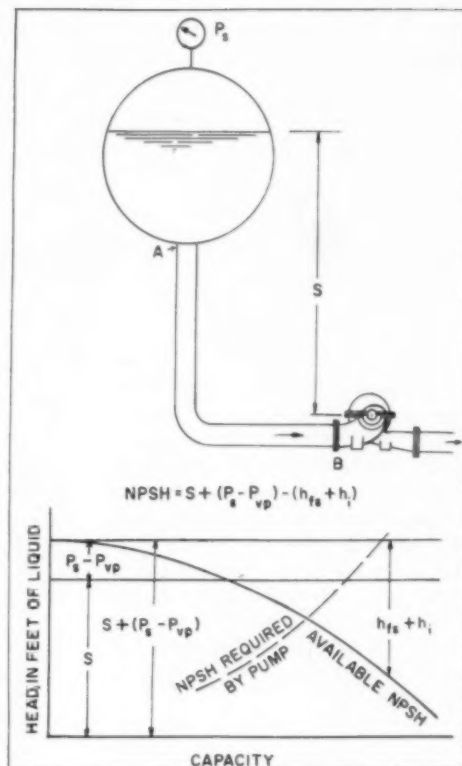
Centrifugal Pump Clinic

QUESTIONS and ANSWERS

By
IGOR J. KARASSIK
Consulting Engineer and
Manager of Planning
Harrison Division
Worthington Corporation

Fig. 1 — h_{fs} = friction loss in suction line from A to B; h_i = entrance loss at A; P_v = vapor pressure of liquid at pumping temperature.

All heads and pressures must be expressed in feet of liquid at the pumping temperature with proper algebraic signs. While P_s and P_v can either be in gage or absolute values, they must both be measured above the same datum.



QUESTION

I FIND YOUR PUMP CLINIC very interesting and now have a question of my own. In approximately two weeks I will be checking out a centrifugal pump that, to-date, has not been meeting the capacity at the desired head. Part of the test will be to determine the required NPSH (net positive suction head). My question at this time concerns this phase of the test.

Is there a published procedure for this part of the test or could you give me a step by step explanation? Assume that the suction and discharge piping is correct as well as the valves and the instrumentation and the pump is below the liquid supply level. Also assume that we have the Head-Capacity curve established as well as the horsepower required.

I would greatly appreciate any information you could supply to enlighten me on this phase of the test. (R. J.)

ANSWER

IF I UNDERSTAND your question correctly, you have run a regular head-capacity-power test on this pump already and are satisfied that your measurements are reasonably accurate; or you still have to run such a test but, again, consider that the test will yield sufficiently accurate results. Your problem, therefore, remains to set up

a test procedure which will give you equally accurate information on the effect of available NPSH on the pump performance.

The Standards of the Hydraulic Institute include a section outlining recommended methods for conducting "cavitation tests," in other words, for establishing the minimum NPSH (net positive suction head) for satisfactory operation. This section is a part of the com-

plete Test Code of the Hydraulic Institute (see pages B-VIII, 1 through 20). Should you have no access to these Standards, you can order them by writing to the Hydraulic Institute, 122 East 42nd Street, New York (17), New York.

The available NPSH is a characteristic of the system in which a centrifugal pump works and is the difference between the absolute suction head and the vapor pressure of the liquid at the pumping temperature. Fig. 1 illustrates the method of calculating the available NPSH for a pump which takes its suction from a supply above the pump centerline. If the supply is open to atmosphere, the value of P_s is, of course, equal to the atmospheric pressure.

If the available NPSH is less than the minimum required by the pump at the desired capacity, the pump will be unable to meet its head-capacity conditions. A typical group of performance curves for a

pump operating under varying suction conditions is shown on Fig. 2.

You will note that the reduction in head for any specific suction limitation is not abrupt; in other words, the head-capacity curve does not coincide with the curve with ample excess NPSH up to some capacity and then break off suddenly. Partial cavitation starts at some capacity lower than the complete breakdown and the head-capacity curve starts to depart slightly, then more and more from its normal shape. Thus, operation at point "A", for instance, may result in some reduction in head from the head developed with greater NPSH.

The determination of critical suction conditions in accordance with the Hydraulic Institute Test Code is tied with the use of cavitation coefficient. Sigma defined as:

$$\text{Sigma} = \frac{h_{sv}}{H}$$

where:

h_{sv} = net positive suction head

H = total pump head per stage.

The critical value of Sigma at which cavitation begins is found by operating the pump at constant specific speed, correcting all values to constant rpm conditions and plotting the corrected head and the efficiency against Sigma as shown on Fig. 3.

In the higher range of Sigma values, both the efficiency and the head will remain substantially constant. But as Sigma is reduced, a point will be reached where the curves break away from a substantially horizontal line. This departure indicates the beginning of cavitation.

Such a test is relatively easy to carry out in a laboratory. It may be somewhat more difficult for an existing installation. For instance, it may not be possible to vary the static elevation between the supply and the pump centerline, to install a stilling chamber in the suction as recommended by the Hydraulic Institute, or to arrange a closed circuit for the pump.

However, if we understand the meaning of "available NPSH" and if we take certain precautions in varying it during the test, we can still obtain a reasonably accurate

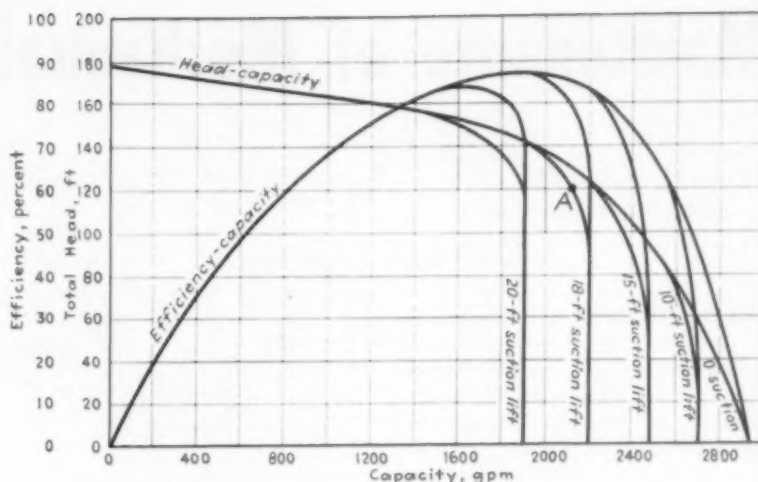


Fig. 2 — A typical group of curves for a pump operating under varying suction conditions.

plot similar to that illustrated in Fig. 3. You can establish the available NPSH by direct measuring, once the vapor pressure of the liquid at the pumping temperature is known. The method recommended for measuring the suction head is outlined in the Hydraulic Institute Test Code on pages B-VIII-13 through 16.

If you are limited in your ability of varying the static elevation, you may be in the position of varying the vapor pressure of the liquid. This will only be the case, however, if you take suction from a tank open to atmosphere, so that the value of $(P_s - P_v)$ on Fig. 1 can be varied. In the case of a boiler feed pump taking its suction from a deaerating direct contact heater, P_s is always equal to P_v . Thus, changing the operating temperature here does not change the available NPSH which is equal to the static submergence less friction losses.

Failing to accomplish your ends by varying the static elevation or the vapor pressure, you will be forced to throttle the suction, even though the Hydraulic Institute does not recommend this procedure unless a stilling chamber can be provided downstream of the throttling valve. If this throttling takes place as far as possible from the pump, the results will not be affected to a significant degree, though they cannot be termed as absolutely accurate.

The test should be run at the

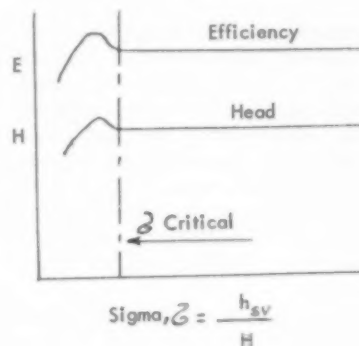


Fig. 3 — Critical Value of Sigma.

rated or guaranteed capacity, adjusting this capacity as necessary. Both efficiency and head should be plotted against Sigma, as shown on Fig. 3.

I have assumed that you are dealing with water. The problem of cavitation and determination of adequate limits when handling liquids that are mixtures of several compounds each having different vapor pressures and latent heats, such as hydro-carbons, is considerably more complex. For more detailed information on the effect of non-homogenous liquids on cavitation, I refer you to "Cavitation and NPSH Requirements of Various Liquids" by Victor Salemann, ASME Paper 58-A-52, presented at the ASME Annual Meeting, December 1-5, 1958, New York City*.

*Worthington Reprint RP-1094.

Maintenance of Mechanical Steam Traps

By H. H. MALTBIÉ

Strong Steam Specialties

FOR SIMPLICITY, this discussion will be limited to mechanical steam traps used in industrial vacuum or vapor heat-transfer systems. But basically, the operating principles remain the same as in other fluid-handling systems employing steam traps.

The efficiency of a heat-transfer system can be seriously impaired by the accumulation of air or condensate (water). Air and non-condensable gas may cause "air binding" and prevent the proper flow of steam. Condensate clogs the system, causes water hammering, stops steam flow and causes damage to machinery and instruments. Steam traps prevent these conditions by automatically removing condensate, air and gases from the system without loss of steam.

Strainers, to rid the lines of scale and other foreign matter, pay for themselves by reducing the amount of maintenance on other equipment in the system.

There are five basic types of mechanical steam traps available today for industrial heat-transfer systems . . . the inverted bucket trap, the open bucket trap, the ball float trap, the combination float and thermostatic trap, and the thermodynamic trap (not discussed here). A sixth type — the tilting trap — may still be found in service, but is not readily available. However, the general maintenance rules and suggestions given here apply to all types.

A good maintenance program depends upon understanding the operation of the traps and strainers, good installation practice (or remedying the existing installation), and regularly scheduled inspections.

Trap Operation

INVERTED BUCKET traps are recommended for drip service, heat

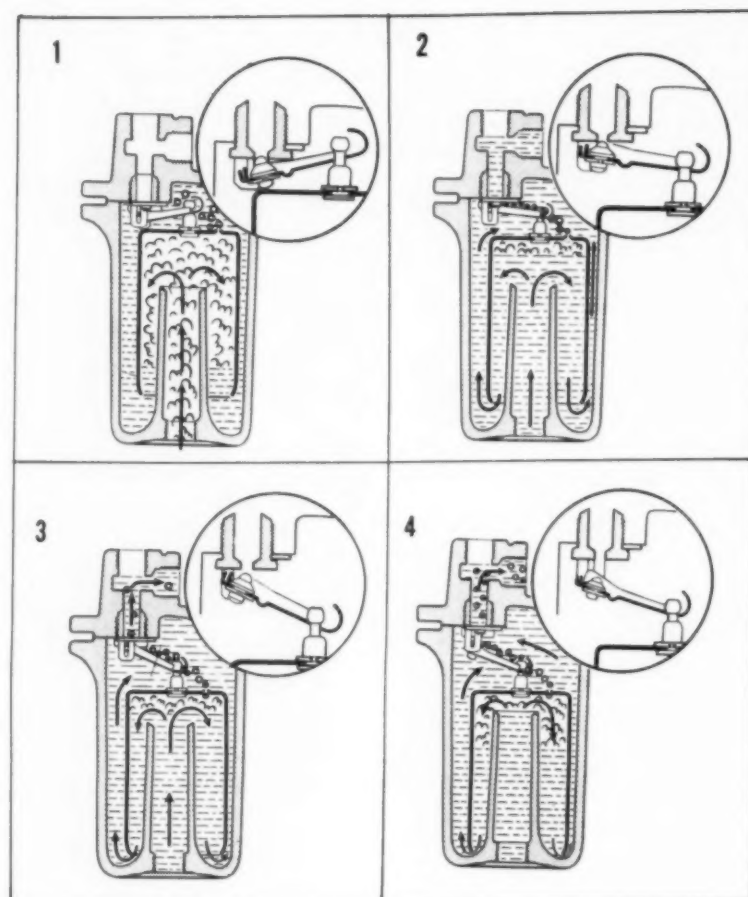


Fig. 1 — Inverted bucket trap. First view shows the trap filling; next, discharge begins; third, discharge continues; and fourth, discharge ends and filling begins.

exchangers, autoclaves, and other drainage jobs in general industrial applications, in central station power plants, refineries, and chemical processing plants, where it is essential to have high capacity for warm-up and surge requirements, yet maintain high efficiency on light loads.

They must perform well over a wide range of pressure fluctuation and condensate loads — from 1% to flood. Maximum pressure-temperature limits for different sizes may vary from 150 psig at 450 F to 2500 psig at 1100 F, with capacities as high as 75,000 lb per hour.

Positive opening and closing of

the valve is imperative for good operation and long valve and seat life. A typical inverted bucket trap, with dual fulcrum lever action for valve operation, is shown in Figure 1.

OPEN BUCKET traps are commonly used for steam line drainage service on pulsating, widely varying or very low (below 5 psig) pressures. Maximum pressure-temperature limits for various sizes may range from 250 psig at 4500 F to 600 psig at 800 F. Open bucket traps are also adaptable for draining lines carrying gasoline, oil, ammonia and other liquids. Some sizes are capable of cold,

liquid, gas or non-shock service as great as 1200 psig, with capacities up to 100,000 lb per hour.

In steam line application, the condensate entering the trap floats the bucket, causing the valve to close tightly, as shown in Figure 2. When the condensate level overflows into the bucket, the bucket sinks, and the valve opens. Steam pressure forces the condensate out of the trap until the bucket is again empty and floats, causing the valve to close.

BALL FLOAT TRAPS, as seen in Figure 3, are used for draining and discharging water from air receivers, air line drips, risers and after-coolers. As air venting traps, they may be used for removing air or gas from liquid systems and water mains. Maximum pressure-temperature limits may range from 200 psig, up to 1000 psig at 450 F, with capacities as high as 48,000 lb per hour.

In drainage applications, the condensate enters the trap by gravity. The incoming water lifts the float, raising the valve off the seat. Condensate flows from the trap until the level drops enough to re-seat the valve.

In venting applications, the trap is installed upside down at a high point in the system. Air collects in the top of the trap until the water level is forced down enough to depress the float and pull the valve from its seat. Air is then discharged until the water level rises enough to re-seat the valve.

COMBINATION float and thermostatic traps are used for removing condensate and air from low-pressure heating systems, and also for drip service on low-pressure steam lines and unit heaters. Maximum pressure limits are 15 psig, temperatures to 350 F, and capacities as high as 5,750 lb per hour.

An expanding thermal element in the float and thermostatic trap permits elimination of air during start-up. When heated, the thermal element closes. When the trap is closed, the ball float is down, keeping the valve shut. As the level of the condensate rises, the valve opens and the condensate is discharged.

Installation Practice

Improper installation is the cause of many maintenance head-

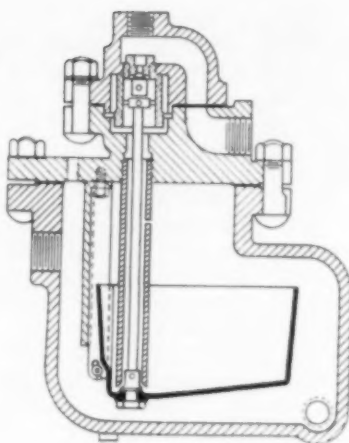


Fig. 2 — Open bucket trap.

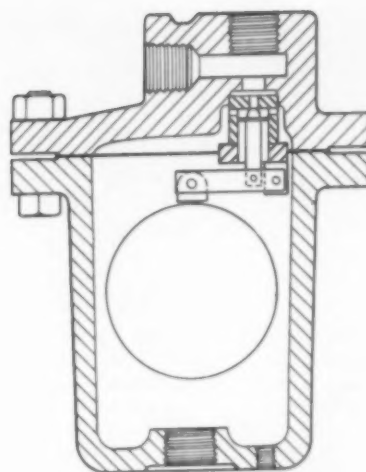


Fig. 3 — Ball float trap.

aches encountered with steam traps. As a rule, traps should be installed below and close to the units being drained, in a location that is accessible for servicing. Where it is impossible to locate the trap below the point being drained, a check should be installed in the inlet line to prevent backflow and loss of prime.

The trap should always be provided with inlet and outlet shut-off valves. The inlet valve is essential so that the trap can be cut off for servicing. The outlet valve is used to shut off discharge when testing the trap. Between the shut-off valves and the trap, provide unions so the trap may be easily removed.

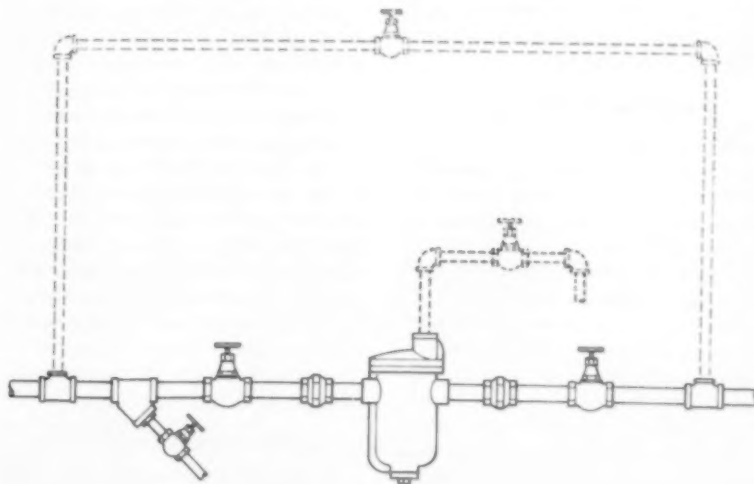
A test outlet between the trap and the outlet shut-off valve is

necessary for good maintenance on all but the smallest traps. A pet-cock or globe valve is sufficient. Always point a free-blow line downward.

Insert a strainer or dirt leg ahead of the trap, depending upon the amount of scale and dirt present in the system. Remember that one tiny piece of scale can impair the operation of a valve. It is best to provide positive protection against it.

In cases where large amounts of air need to be eliminated during start-up, use a manual or thermal by-pass. Pipe for a by-pass can be at least one size smaller than the trap line. The by-pass valve should be located above the level of the

Fig. 4 — Recommended installation of a side inlet, side outlet trap.



trap to avoid loss of the prime.

When starting up, blow out the line with steam before installing the trap. This is to remove loose dirt, scale, pipe cuttings, pipe cement, and other foreign materials which could clog the trap right from the start.

Prime the trap by closing the outlet valve and opening the inlet valve slowly. Then open the outlet valve. If the trap fails to catch the prime due to a small amount of condensate in the line, the trap may be primed by pouring water in through the test outlet.

A typical recommended installation of a side inlet, side outlet trap is shown in Figure 4.

Strainers

Strainers may be classified as self-cleaning and non-self-cleaning. The self-cleaning types employ a blow-off valve or plug for purging. In the non-self-cleaning types, such as the basket type, the screen must be removed for cleaning.

Part of any regular maintenance program should include blowing down or cleaning the strainers. Although only a tablespoonful of scale may be accumulated in the strainer over a five-year period, one piece may hamper valve operation. It is best to keep the screens clean as a regular maintenance practice.

Screens are available with various sizes of perforations, depending upon their service. Too fine a screen will clog easily. Too coarse a screen will pass harmful scale flakes. In general, a stainless steel screen with .027" perforations will perform satisfactorily for years without corroding.

Scheduled Maintenance

Most serious maintenance problems can be avoided by periodic inspection and cleaning of steam traps and strainers, following a regular schedule. For low-pressure (50 psig and under) systems, the traps and strainers should be inspected every three to six months. Medium pressure (50-125 psig) traps and strainers should be checked every two or three months. High pressure (above 125 psig) systems should be inspected every 30 to 60 days.

There are three methods of inspecting a steam trap, to determine if the valve is properly operating:

VISUAL — Close the outlet cut-off valve and open the test outlet valve. Observe the discharge. If, after every discharging cycle, the valve closes tightly, the trap is working properly. Caution: don't confuse "reflash" with steam loss. "Reflash" steam is caused by hot condensate passing through the trap orifice and flashing into steam due to contact with atmospheric pressure and pressure drop. This is a normal occurrence, and does not require servicing.

LISTENING — Use stethoscope, amplifier or other device to listen to the valve operating. If such listening aids are not available, hold the tip of a long screwdriver tightly against the trap and put your ear against the end of the handle. Caution: know the sound of the valve; you may be fooled by other noises in the system.

PYROMETER — Outlet side temperature should be lower than inlet side. Caution: because temperature readings may vary at different points on the lines, results are merely indicative, rather than conclusive, of valve operation.

Most maintenance men prefer to use the visual test, which is simple and accurate enough for most installations.

Trouble Shooting

Here's a handy list of troubleshooting hints that cover most types of steam trap malfunction:

If trap fails to discharge:

1. Check to be sure water is reaching trap. The strainer ahead of the trap may be clogged, or the pipe or valves may be plugged.

2. Trap may be pressure-locked. Check the inlet pressure. It may be too high for the pressure rating of the valve and seat, or perhaps it's due to a change in pressure for the installation without changing trap seats. Re-check conditions and select a new trap or valve and seat. If the trouble appears to be a worn orifice, replace the valve and seat.

3. Check to see if the trap is clogged with dirt or scale.

If trap discharge is continuous:

1. Seat may be leaking. Replace.

2. Trap may be too small. Select larger trap.

3. Valve seat may be clogged with dirt or scale.

4. Foaming of boiler may cause unusually high amounts of water in the line.

If steam is being lost:

1. Valve and seat may be seating improperly due to wear or foreign matter. Replace valve and seat.

2. Trap may be losing its prime. If trap is blowing live steam, close the outlet valve for several minutes and then open it slowly to reprime. If the trap fails to reprime, check the valve and seat. Keep in mind that sudden drops in pressure can cause loss of prime. Where this is likely to occur frequently, install a check valve in the intake line.

If unit heats slowly:

1. Trap needs more air or condensate removal capacity. Install a thermal vent or by-pass, or re-size the trap.

2. Unit may be short-circuited. This occurs when a trap is used to drain more than one unit. Proper trapping calls for individual traps on each unit.

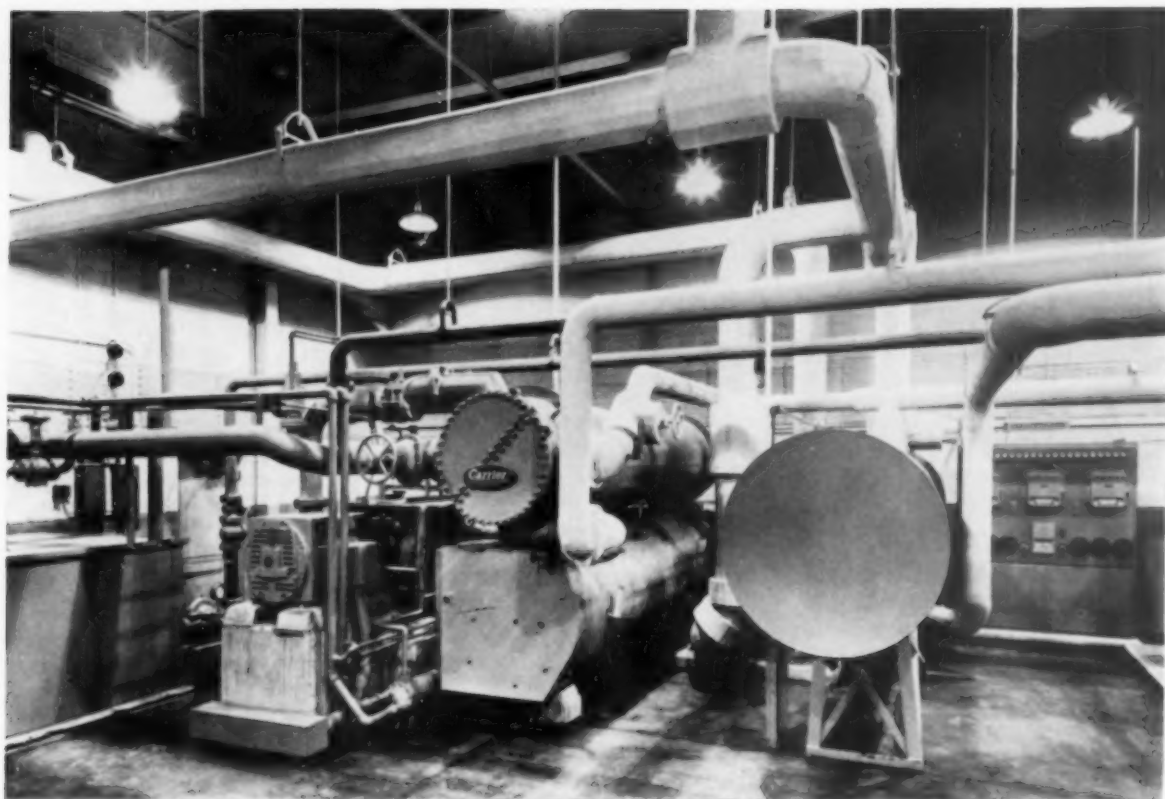
Spare Traps Cut Cost

In most applications of steam traps in high-production industrial plants, it is not possible to repair or clean a trap in the field. It usually represents a waste of time, manpower, production and system fluid. By cutting off the malfunctioning trap and replacing it with another one from stock, the system can be back in business in a very few minutes.

In addition to the downtime eliminated by using this replacement method, one large manufacturer has realized further savings by carefully selecting the best quality traps available, and using only three types or sizes in his plant.

Each replacement "spare" is equipped with the same diameter inlet and outlet fittings with the same face-to-face dimensions, so that it will fit perfectly into the unions provided on either side of the trap. On any trap maintenance

(Continued on page 69)



Heat pump installation at Masland plant in Mocksville, North Carolina

Heat Pump Cuts Conditioning Cost

THE WORLD'S FIRST centrifugal heat pump using outside air as a source of heat in winter has been put into operation at the Masland Durable Leather Company's new \$1-million plant in Mocksville, N. C. The firm manufactures vinyl upholstery and wall coverings.

Russell Gray, president of Carrier Air Conditioning Company which built the equipment, said the new system has a cooling capacity of 280 tons.

The operating cost of the Masland system is expected to be only half as high as that for a conventional system with separate heating and cooling plants. An owning and operating cost study by William F. Lotz, Inc., Philadelphia engineering firm who designed the plant for Masland, showed first cost for the heat pump and conventional units were about the same. But it will cost only \$5,500 per year to run the

heat pump, compared to \$10,000 to operate a conventional system.

The new system for the 140,000 square foot plant consists of two electrically-driven centrifugal chillers. The air-to-air heat pump is driven by a 300 horsepower electric motor and has a cooling capacity of 200 tons. Heat from a process chilling load handled by a hermetic centrifugal refrigerating machine with 80 tons cooling capacity supplements the winter heating system as an economy measure. The box-like tank at left in the photograph contains defrost water. Heat absorbed by brine from cold outside air is transferred to water in the heat exchanger at right center in the photo.

In summer, the larger machine removes heat from interior spaces and transfers it to the outside through a cooling tower. In winter the cycle is reversed. Heat from

cold outside air will be extracted as the air is pulled through a large coil containing antifreeze. Heat from a process load obtained by the smaller chiller will supplement the winter heating system.

During the plant's two-shift operation, conditions of 80 degrees and 50 per cent relative humidity in summer and 72 degrees in winter will be maintained.

"Water is often a more efficient source of heat than air," Mr. Gray said, "but water is not available in sufficient quantity or quality in Mocksville or many other areas throughout the nation. Most large heat pump systems will necessarily take heat from outside air or from spaces inside massive block-type buildings. Heat and cold will be transported in a closed water-piping circuit between the heat pump and air conditioning equipment spaced about the building."

The Techniques of Casualty Investigations

By **ROBERT H. EMERICK**
North Charleston, S. C.

THE FLASH of an explosion leaves five men dead and burns a dozen others so badly they are hospitalized.

The nature and cause of the explosion in the meat room of a cold storage plant are unknown. No dangerous material has been kept in the room, and no unnatural residue is found.

The investigation of this casualty is of particular interest to us, because of its broad demonstration of important procedures in achieving a solution.

First—The investigation was undertaken by a team of three, rather than by an individual. This is an important consideration in the handling of major casualties, since the findings of a group, or board, are much less likely to be chal-

lenged in court, than the pronouncements of one man. A group also is better able as a rule to sift the significant from the insignificant simply by introducing their different reactions and points of view.

Second — The investigators placed immediate emphasis on identifying and cataloging the observable facts in the case, instead of interviewing witnesses and survivors.

Two reasons support this priority of procedure in all cases (unless later testimony from certain witnesses would be impossible). (a) Material evidence has a habit of disappearing from the scene of a casualty either innocently or on purpose, so the sooner we can go over the site the better. (b) The

testimony of a witness is not worth a sneeze if it is contrary to established facts. We'll see in this case how witnesses' reports could not be supported by the facts of the case, based on natural laws.

Significant Facts

Here are the significant facts as developed by the investigators:

1—A fire in the room next to the meat storage room, approximately 12 hours before the explosion, melted copper refrigerant piping and cut off all refrigeration to the meat storage room. For this reason, the meat was being transferred at the time of the explosion to another room.

2—The construction of the meat room was conventional with approximately 12 inches of cork, swabbed with bitumastic, and finished inside the room with plaster on chicken wire. The plaster showed several slight cracks, but there was no evidence of serious damage.

3—The refrigerant was a proprietary compound, neither explosive nor flammable.

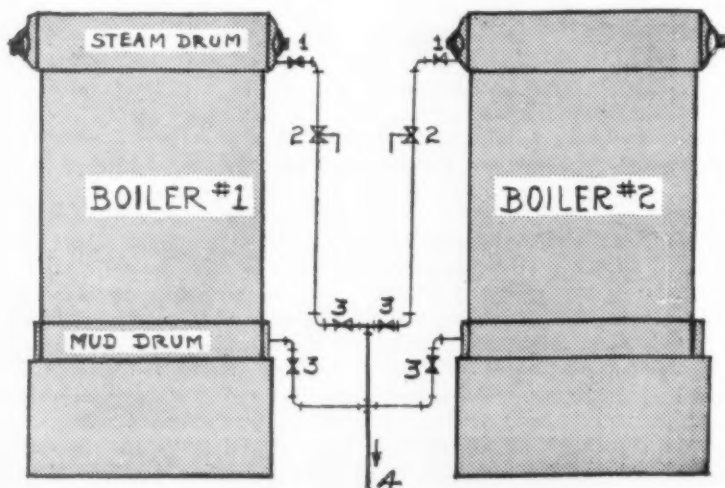
4—No refrigerant was left in the system.

5—The presence of a slightly odorous gas after the explosion was noted, and an explosimeter showed the atmosphere in the room to be approximately 50% explosive.

At this point, efforts were made to vent the area but the unstable condition of the atmosphere persisted. Obviously a dangerous gas was seeping into the room from some unknown source; and the investigation, therefore, concentrated on identifying the origin of the gas.

Since the atmosphere in the rest of the plant was normal, with only the meat room dangerous, the breeding place obviously was local.

Original arrangement of blow down piping. 1—globe valves, 2—quick opening valves, 3—stop valves, 4—line to blow down pit.



After several days of probing, an area of hot insulation was discovered in the meat room wall, where, charring in the absence of air, the mixture of cork and bitumastic was emitting a gas composed of carbon monoxide, hydrogen, water vapor and other hydrocarbons. This mixture is highly explosive, and it was seeping into the room through cracks in the plaster finish.

The investigation, therefore, was able to identify the fuel of the explosion, but the question remained, how did it ignite? These additional facts having some bearing on the question were catalogued:

1—The normal lighting circuit in the meat room had been disrupted by the earlier fire in the adjacent room, consequently the men unloading the room had been working by several 500 watt flood-lamps.

—The flood-lamps were burning normally after the explosion. They showed no signs of damage.

3—The lamp cables were rubber covered and new. No insulation breaks were found.

4—Working on 115 volts, and with the wires thoroughly insulated as they were, there was no corona.

5—No metal flooring existed against which a shoe nail might have scraped a spark.

6—No matches, cigarettes or tobacco, or any evidence of their having been there, could be found.

Questioning of the survivors and witnesses began after the cataloging of facts was completed. Some of the statements agreed with the facts, but others were at variance—demonstrating how commonly a witness reports on what he thinks he saw. For example:

Q—Where were you at the time of the explosion?

A—I was just outside the door of the meat room. I was about to move away when I saw a man light a cigarette.

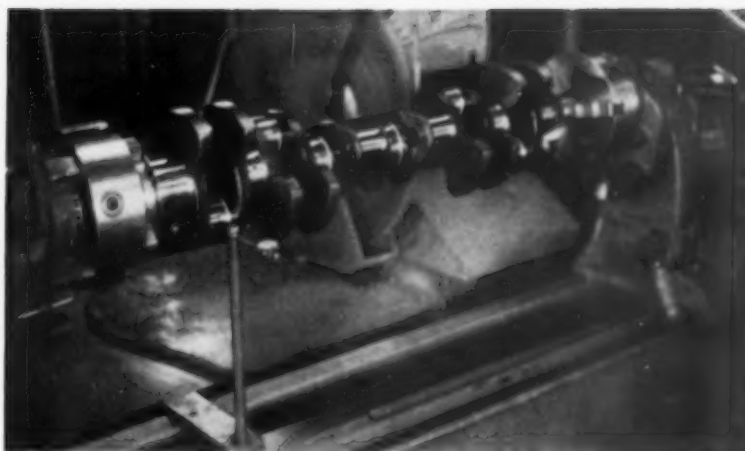
Q—Can you identify the man by name, or otherwise?

A—No.

Q—Did you see him take a cigarette from his pocket, or from a package, and then strike a match?

A—No.

Q—Then how do you know he was lighting a cigarette?



Determining extent of casualty can involve checking equipment internals. This Diesel crankshaft is being measured for distortion after an engine failure.

A—Well, I saw a little blue flame. It was high up, around his hat brim.

Q—Did you ever before see a man light a cigarette at or around, his hat brim?

A—No, I don't think so.

Q—But you're still sure he was lighting a cigarette?

A—I think so. But everything happened so fast, maybe I was wrong.

The absence of a match, or tobacco scraps in the area left this testimony unsupported, consequently smoking as a cause of the explosion, was rejected.

Another witness saw, he said, a blue light running along a lamp cord.

Q—Did the flame seem to be attached to the cord?

A—No. Sometimes it seemed to be in the air, 3 or 4 feet above the cord. It all happened in a second.

What this man remembered probably, was a stratified gas in which the propagation of the igniting flame traveled momentarily along a flammable vein before culminating in the major flash. The facts offered nothing to support his story of a light on the lamp cord. A corona, even if it had been possible, would not jump around in the air, three or four feet above the conductor.

The investigators never did determine beyond a reasonable doubt, just what ignited the gas. In their report, several possibilities were mentioned including the

hot surfaces of the flood-lamps, a spark from a shoe nail, a static discharge, all without factual support. One interesting speculation concerned a smoldering shred of the charring insulation falling through one of the plaster cracks, blazing momentarily as it met the oxygen in the air, thereby igniting the explosive atmosphere. The shred of course would be consumed in the moment of the blast, consequently it would disappear and leave no trace. The theory could not be proved.

This phrase "beyond a reasonable doubt" is extremely important. Just as American law presumes a man on trial to be innocent until proved guilty, so a casualty investigator must be prepared to prove his conclusions beyond a reasonable doubt. Otherwise the conclusion is forever open to question.

Incidentally, proof of a conclusion is not established on the say-so of witnesses, unless their words are supported by the observed facts. As we have noted, it is human to misinterpret what we see, and to exercise the imagination unwittingly.

Handling The Cover-Up

"I didn't see a thing," is a natural attitude in a witness who feels that, by opening his "big mouth," he will compromise either his own position or the position of a friend.

Our technique in these cases is

to note whatever the reluctant witness chooses to give us, which may or may not be true as far as it goes. The validity of such information is soon determined by attempting to match it with the facts.

Then we simply go beyond the people who will not talk and visit with those who will. These latter generally are so far removed from the casualty, either in time or place, that the significance of what they tell us is not apparent as a rule, to anybody but the investigator.

As an illustration of this procedure, consider the case of the dead boiler that came to life, and put a man in the hospital by doing so.

This boiler was one of a battery of two, cross drum, sectional header units, connected as shown in the sketch. Boiler No. 1 developed a leaky tube seat in the steam drum and was taken off the line for re-rolling and a general internal inspection. All water was dumped.

As soon as the boiler cooled sufficiently, a man went into the drum and commenced to work. Shortly afterward live steam spurted into the drum from the surface blow down line, and scalded the workman badly.

Since the rules of this plant required that a killed boiler should be isolated by having all connection valves closed and tagged, the obvious thought was that somebody had been negligent.

The investigator, an individual in this case made his usual study of the facts before talking with any of the boiler room personnel. He made these notations of fact:

1—The boiler in which the casualty occurred had been off the line for 2 days.

2—Blow down from a live boiler was a once a day procedure, usually soon after the beginning of the day shift.

3—All of the blow down valves were in good condition and when closed, they closed tightly.

4—That the absence of check valves in the blow down lines was contrary to safe practice.

The fireman who blew down boiler No. 2 and caused the casualty had not closed the valves on the other boiler. That was done the day before, his off-day he said; but he was positive the valves were all tagged shut before he



Fire causes are identified by a constant sifting of possibilities checked against established facts and natural laws. Official U. S. Navy photograph.

opened his own valves. The day engineer confirmed the tagging of the valves.

"I saw them myself before No. 2 was blown down."

The man who reported he actually closed the valves reported that he also had tied on the tags. Apparently somebody, for some mysterious reason, had reopened the valves. The investigator began to wonder if reopening had been intentional, with intent to harm the injured man. He decided to make some seemingly irrelevant inquiries.

He talked with the doctor in the plant dispensary. If there had been fights, perhaps one or the other of the participants might have needed a bit of first aid in the recent past.

"We rarely get people from the boiler room," the doctor said. "Pretty safe place to work on the whole. The only man we've had in a year, except for this scalding case, was a fireman who came in with an upset stomach. The shift was nearly ended, so I sent him home. No fights ever, so far as I can remember."

The medical record showed the sick fireman to have been the man who stated he had closed and tagged the valves on Boiler No. 1. The record also showed his illness occurred on that same day.

Any connection seemed remote, but the investigating engineer asked the fireman a few more questions, just on the chance that his answers might produce some-

thing significant:

Q—Did you tag the valves before or after you went to the doctor?

A—Before. He sent me home.

Q—You did it all yourself? Nobody helped you?

A—I did it. It was my job to drain and tag the boiler, and I did it. I put on the tags at the same time I opened the valves. That showed the boiler was out of service.

Q—When did you close the valves?

A—I closed them after the boiler was drained.

Q—You're sure you closed them?

A—Sure. (There was a little hesitation.) Well I must have closed them. It was my job to close them.

Q—But you can't remember exactly when you closed them?

A—Well, no. I do things like that as a habit, without thinking.

In this last answer was the key to the mystery. The fireman simply had not closed the valves before reporting to the doctor, and he went directly home thereafter. He didn't remember his oversight until the casualty occurred. Then being human he said nothing about it. Except for the doctor's remark and his medical office records, the blame almost certainly would have been placed on a person or persons unknown.

This is an excellent example of how seemingly irrelevant inquiries made in areas distant from the time and place of the casualty, can lead

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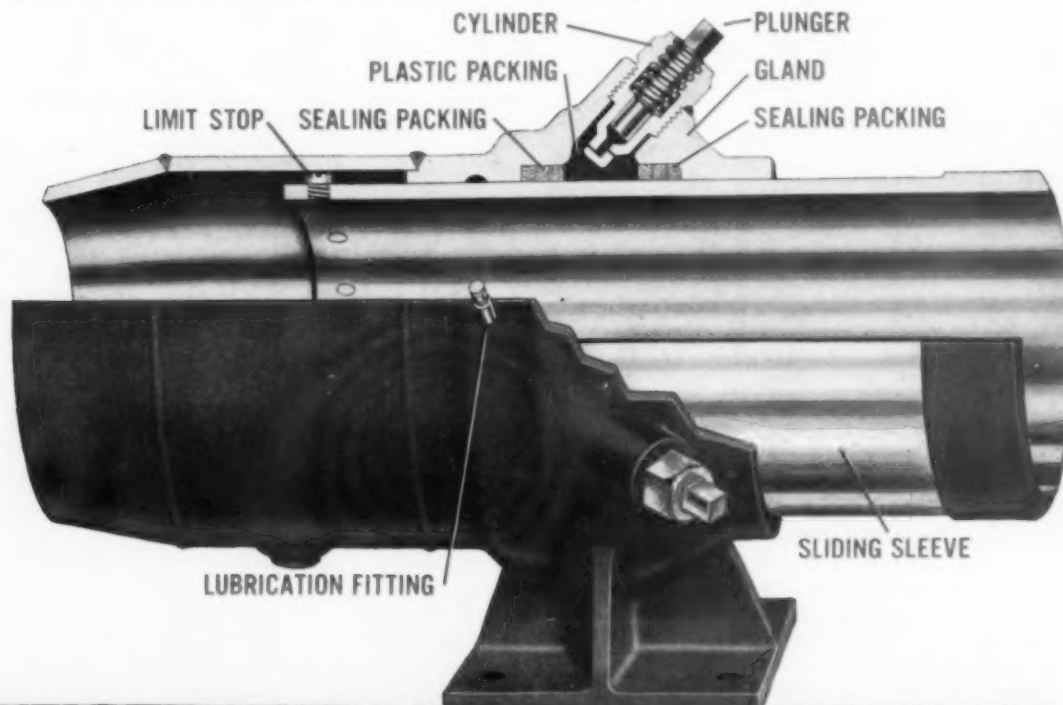
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to a determination of the cause. It also is a first rate example how facts properly catalogued, can be misinterpreted. We might look for somebody who opened a valve which, actually, never had been closed.

We should note that this casualty brought about the installation of check valves in the blow off lines, thereby achieving a prime purpose of all casualty analyses to make repetitions impossible or unlikely.

Questioning Techniques

There are a half dozen useful rules which help to obtain oral information. Their value has been established by experience, and here they are:

1—For the direct questioning of persons intimately connected with a casualty, for example shift engineers, firemen, electricians, etc., choose a quiet place well away from the man's job. Distractions are reduced, a little reflection is possible, and the importance of being accurate is emphasized.

2—If the individual is nervous or feels he wants advice before answering, he may be accompanied by a friend with whom he can confer; or if he feels his own position is in jeopardy, he may have a legal counsel beside him. The point to emphasize is that the purpose of the inquiry is purely to establish facts and to prevent future casualties of the kind which has occurred.

Any accusation of fault in an individual must be made by others. Moreover, no presumption of individual negligence will be made in the report, and no implicating explanation of a casualty will be made unless it is supported by evidence beyond a reasonable doubt.

3—Answers to questions are not made under oath. Talk informally.

4—The questioner should endeavor to phrase his questions to bring a yes or no answer. Avoid, general discussion among all present.

5—If a good foundation for yes and no answers is lacking at the start of the inquiry, establish one simply by directing the responder to tell his story in his own words and in his own way, describing what happened. Then ask specific questions.

6—For "fishing" questions asked of those who are not apparently involved directly in the casualty — go to them at their work place. Noise and distractions may be there to contend with, but here we want reactions unconditioned by a sense of significance. An air of casualness is essential.

Investigating Engineer

In most industrial organizations, the safety engineer is first choice in activating the investigation of a casualty. In others, the assignment may go to an outsider so far as the safety department is concerned, possibly to a qualified engineer from the design section.

The reason for the latter approach is two-fold: 1st, an unconditioned viewpoint of the outsider just possibly might see facets of the occurrence not picked up by those too close to it. 2nd, this policy makes possible the selection of a specialist in the field, whereas the safety engineer is likely to be more general in his approach, not qualified to recognize significant design and material facts.

A responsibility, however, rests squarely on the man or men selected. There must be no guessing, no chance taking in arriving at a conclusion. The individual who feels his particular knowledge and experience are not closely related to the problem at hand, should disqualify himself immediately.

For example, a mechanical engineer should not undertake electrical failure analysis, and an electrical engineer has little place on a board investigating a bridge failure. Each should cleave unto his own, and not accept responsibility from management that too often considers an engineer to be an engineer, period.

Making The Report

Having catalogued our facts, completed all the talking necessary and reached a conclusion, we are ready to prepare the report. Normally we can expect it to fall into four major sections somewhat like the following form:

Section I — Narrative.

This is simply an account of what happened, when, where, what. Noted is the nature of the casualty, whether fire, explosion, a collapse, equipment failure.

Section II — The facts.

Wording can be substantially as follows:

(a) That persons were killed and injured.

(b) That the which (exploded .. burned .. collapsed .. split .. etc.) was of (capacity) manufactured by in the year

(c) That it had been (checked .. tested .. inspected) .. on and was found to be (un)satisfactory, or (un)safe.

(d) That the extent of the damage was (\$) and consisted of

(e) That the weather ... (condition) did not (did) contribute to the casualty.

(f) Identify any other facts that have a bearing on the casualty and present them in similar form.

Section III — Conclusions.

Here is given the why of it all, the explanation of what happened beyond a reasonable doubt. For example in the case of the blow down scalding, the wording could be:

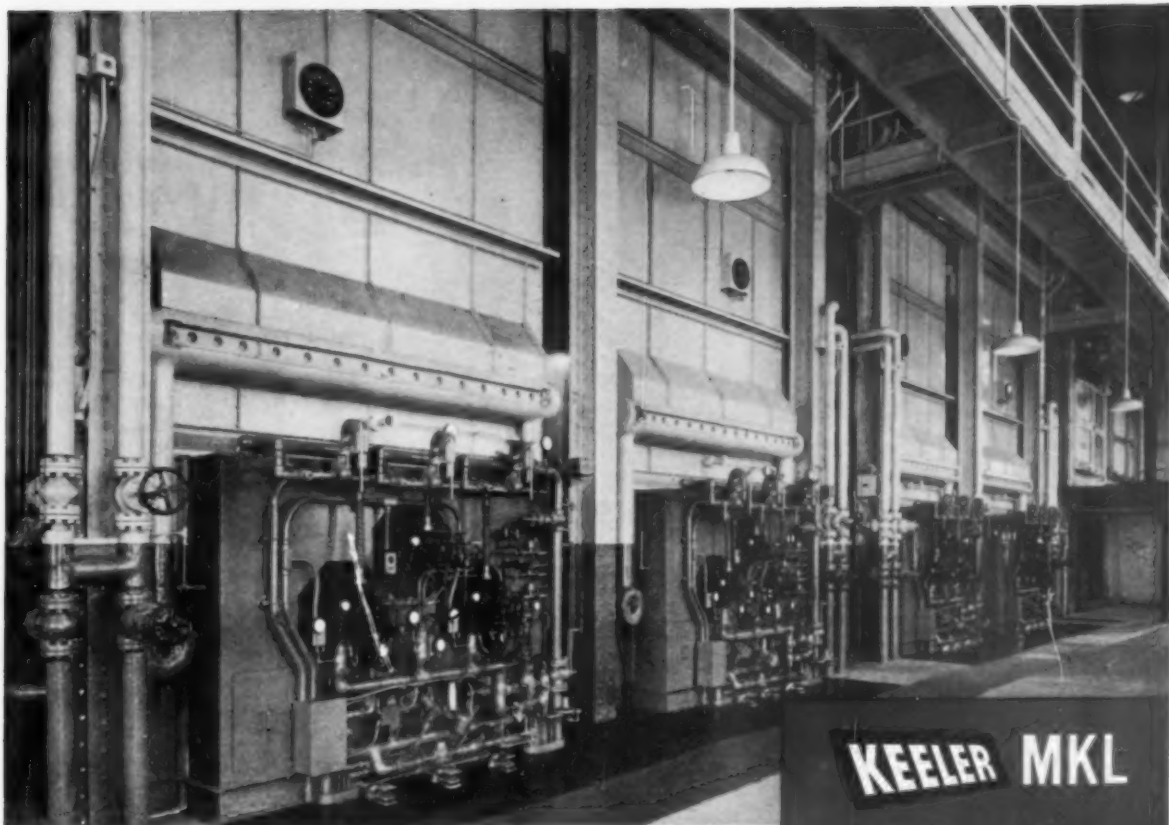
"This casualty was caused proximately by the open position of certain valves on the blow down system of the cold boiler, and which should have been closed during the blowing down of the other boiler in the battery; and by the absence of adequate safeguards on the blow down system which should be present to stop back blow during the blow down procedure."

We note that no accusation is made of the fireman's negligence. This attitude is necessary to limit the function of the investigation to the finding of facts. Any charge of individual negligence must be made by others; the investigating body is not an accuser.

In the event causes cannot be established beyond a reasonable doubt, the conclusion so states. The conclusion must not deal with possibilities or assumptions, since this would remove the investigation from its pure function of fact finding.

Section IV — Recommendations.

Whether the investigation does or does not reach a fact-supported conclusion, the purpose of this section is to present suggestions by which similar occurrences may be escaped in the future. These sug-



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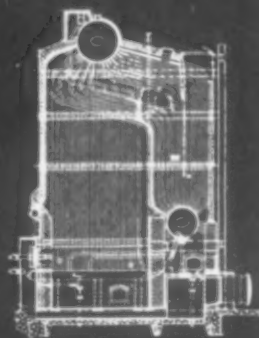
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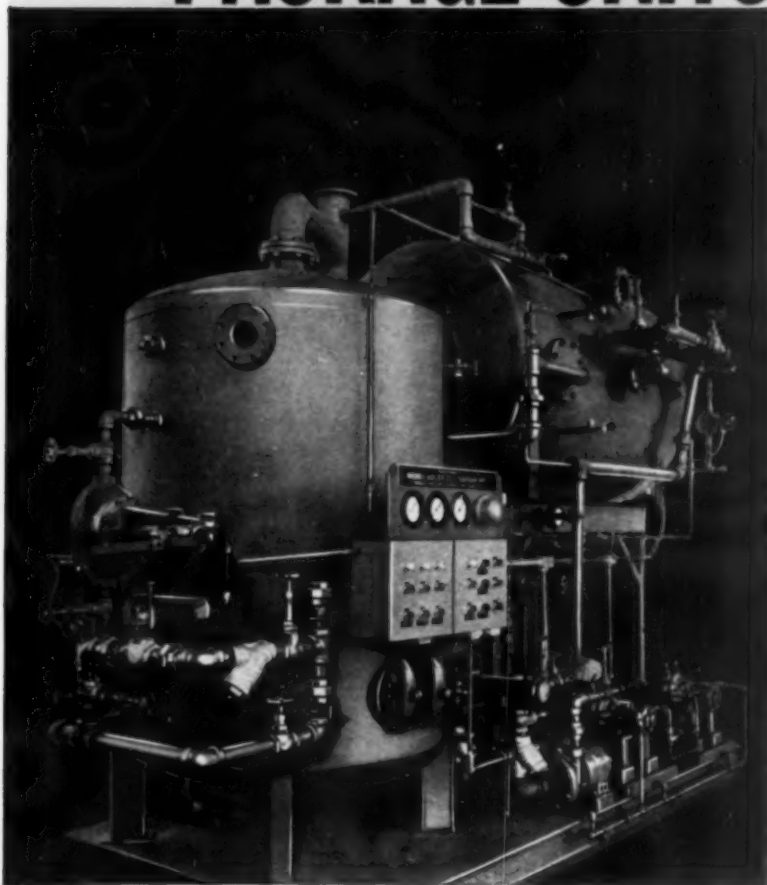
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gestions can run all the way from material and design improvements, right into operating practices.

Those to whom the report is made are not obligated to follow the suggestions in any degrees. The investigating body has completed its responsibilities when it makes them.

Sound Explanation

We cannot always achieve a sound explanation, but the percentage of success is remarkably high. The Department of Com-

merce which investigates airplane crashes have remarked unofficially they can determine causes beyond a reasonable doubt in 95% of the cases. This is true even if there are no survivors. This emphasizes the overwhelming value of facts over witnesses.

Industrial casualties should not be more difficult than those faced by the Department of Commerce. If we work carefully and logically we should be able to approach their admittedly high accomplishments.

nounces that, because of the unique construction, the new belt is particularly adapted for operating over 45° idlers, an objective that was previously unobtainable for all but very light materials.

Ray-Man construction is doubly compensated so that the outer ply stretches as the inner ply contracts under both lateral and longitudinal flexing, and even on reverse bends. The outer plies are constructed with a special weave high-strength synthetic fabric of carefully controlled elasticity, which relieves the stress on the belt as it travels over idlers and terminal pulleys.

To underscore their claims for the performance and reliability of the new product the manufacturers offer a guarantee against ply or cover separation at the idler hinge line — good for the life of the belt — when it is used with troughing idlers set at any angle up to 45°.

Several advantages are claimed by the manufacturer to result from the use of Ray-Man belt and 45° idlers. Initial cost is lower because narrower belts and conveyor equipment will haul the same loads as belts on 20° idlers. Less space is required for narrower conveyors. Maintenance costs are lower because there is less spillage — operation is cleaner and safer and there is less downtime. There is less wear on the belt, and the cost of belt replacement is lower. If belts of the same width as a 20° idler conveyor are run on 45° idlers, load capacity can be increased by as much as 60%.

Conveyor Belt for 45° Idler Operation

THE PRINCIPAL advantage in the use of the 45° idler design for conveyor belts is the greater payload made possible with systems of this type. The use of 45° idlers will increase the carrying capacity of the belt, regardless of the type of material being conveyed. This increase varies with different "angles of repose" due to the size and shape of the particles and the moisture content of material handled.

For example, 25% greater capacity may be expected when conveying coal, sand, gravel, stone, ore, lump gypsum, coarse salt, and lump lime. A capacity increase of 60% will result when whole grain, seeds, dry silica sand, or wet concrete are conveyed. 12% greater capacity results from use of 45° idler conveying systems in handling wood chips, bark, bagasse, green malt or hops, shredded cane, damp fines, and tempered foundry sand.

Difficulties encountered in operating conventional conveyor belts at 45° has been caused principally by ply separation and belt failure occurs at the so-called "hinge" line where the belt bends between the bottom centering roll and the concentrating side rolls. The reason is that all plies in a conventional "slab" belt are of the same fabric and have the same characteristics. When the belt takes a short radius bend as between side and center idlers under heavy load, the bottom outer ply on the radius gets most of the tension strain, while the top outer ply may be in compression. The fatigue

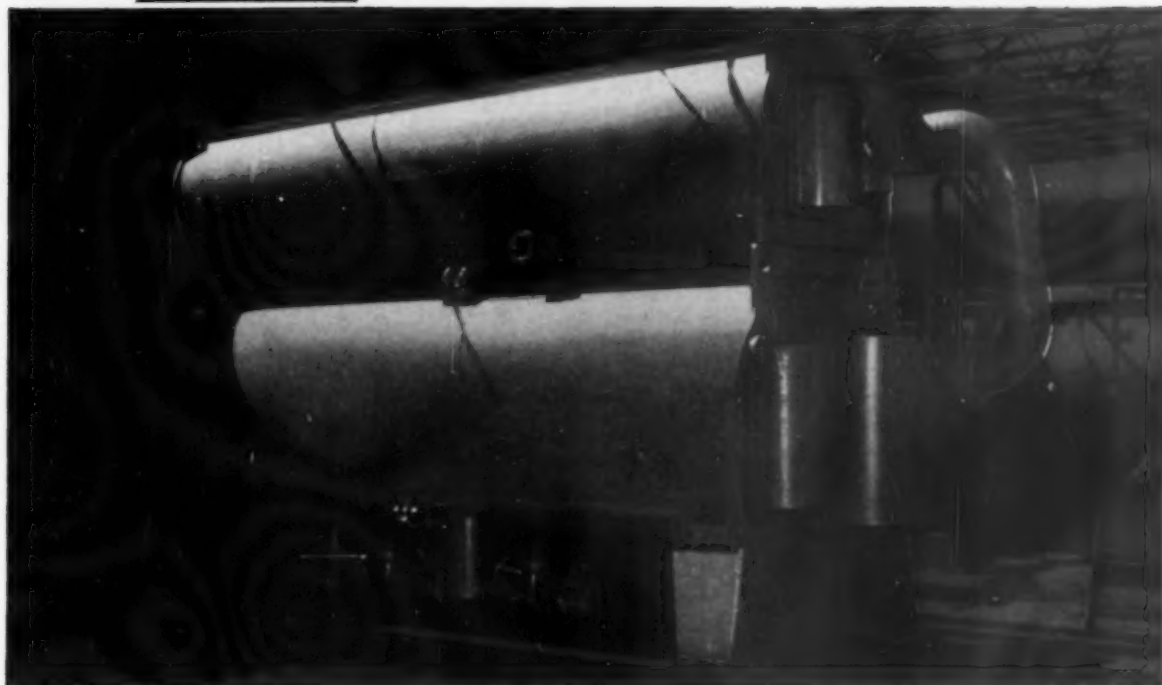
caused by stresses set up between plies in a "slab" belt is particularly acute when the belt travels between the troughed idlers and the terminal pulleys.

According to Manhattan Rubber Division of Raybestos-Manhattan, Inc., it is now possible to successfully use the benefits of 45° troughing idlers for carrying all materials with its Ray-Man Conveyor Belt. After several years of testing (see photograph) the manufacturer an-

500 ft Ray-Man conveyor belt, 45° idler installation, Stockbridge Stone Co., Stockbridge, Georgia. No sign of wear after several years of operation. Note full-contact training, which makes this belt suitable for 45° idler conveying system which can increase belt capacity up to 60%.



Even boiler-cooled air conditioner faces the *Oldest* of maintenance troubles



Lithium bromide absorption systems need protection of their condenser cooling circuits

A popular development in air conditioners is the boiler-fed, water-cooled lithium bromide absorption system. It is economical and efficient, but since water plays a major part in its operation its maintenance problems are the same old ones—metal rusting, pitting, scaling and reducing efficiency to a point of complete breakdown.

Two ANCO products—Coolex and SR-2—can help you get and maintain top performance from your air conditioning system by neutralizing the effects of scale-forming and corrosive elements. Coolex and SR-2 keep rust and scale from forming and acting as insulators, from reducing heat trans-

fer to an ineffective minimum. With the proper treatment program using these products the capacity of your system is maintained, operating costs are held to a minimum.

There are competent ANCO service representatives throughout the South who are experienced in all phases of water treatment and who will be glad to come by your office and give you the full story. Call or write to one of the offices listed below and we'll see that you get prompt attention. A simple maintenance program now may save you hundreds of dollars later, and there is no obligation on your part for talking with one of our men.

Write today and request an Anderson service engineer to make an analysis and recommendation on your plant's water treatment. There is no cost for this service.

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Dallas 7, Texas: Box 10444, Industrial Station • Phone: RIVERSIDE 8-7080

Good Personal Traits Make Good Employees

By JACK TOTTEN

THIS TREATISE is about character. It is assumed that you know enough about the education and experience of your applicants to evaluate their qualifications in this regard. With the questions of capability or competency out of the way, you can concentrate on the really important aspects, namely, the character traits which you consider essential.

There are three human traits which are of outstanding importance to us in the make-up of a personality: integrity, common sense and good nature.

An individual having integrity is morally sound and is trustworthy. Common sense hardly needs definition. We associate it, however, with native intelligence, prudence and discretion. A man of good nature is approachable, generally pleasant to deal with and cooperative. If you find a man possessing these three traits, hire him even though his other qualifications may leave something to be desired.

Integrity

If a man has integrity, we know that he is sincere and honest. He may make mistakes, but he will not attempt to conceal them and we possibly can help him out of his troubles. He will not make promises which he knows he cannot fulfill. He will not shirk responsibility, nor attempt to transfer the blame to someone else when he is at fault. He will govern all his actions by what his conscience tells him is just, right and moral. Big or little bribes are no temptation to him.

He knows the value of expediency, yet will not fall into the "end

justified the means" trap. He will not knowingly misrepresent himself. We can inspire in him interest, enthusiasm and a desire to learn. We can help him to develop his analytical, planning and administrative abilities, but if he has not integrity, all our efforts will come to naught.

Common Sense

If a man has common sense, we know he will act prudently. We can expect him to know the value of time and money, both his own and that of others. Seldom will he make the same mistake twice, because he is observant. He never worries or has regrets, because he knows that worrying and regretting are futile. He may be relied upon to put first things first. He has energy, flexibility and is emotionally mature.

He will have some ingenuity or at least an ability to improvise. He can recognize that there are several ways of accomplishing some tasks, and his score in picking the economical one will be high. He can distinguish when it is safe to take a thing for granted and when to investigate for himself. His ear is finely attuned to hints and he profits at every opportunity from the experience and knowledge of others.

His common sense is responsible for his being self-controlled and self-respecting. He never takes himself too seriously and he knows when not to take other people too seriously. He has a sense of humor and he knows how to use it to relieve tensions which are interfering with getting the job done. He knows the dangers of losing his temper as contrasted to the ad-

vantages of "controlled anger." He is the master of his emotions and impulses.

He is agreeable but can be relied upon to disagree when the occasion demands. He does not have to be told that what hurts his employer hurts him. He does not hesitate to ask questions, but when receiving instructions is an alert listener and, therefore, we do not have to go over the same ground several times to get our message across to him.

Good Nature

Nothing, I repeat, nothing can be substituted for good nature. I would rather deal with a good natured ignoramus than a vindictive doctor of philosophy. The good natured man makes a good teammate. Long since has he learned the value of cooperation and he knows that few worth-while accomplishments in this world are possible without it.

He helps others with no trace of condescension and he will not hesitate to seek help from anyone if he needs it. He is humble without being obsequious. He advertises his approachability and he listens to all suggestions regardless of the source.

He may not have had a formal course in psychology, but because of his interest in people he has developed clear ideas of what makes them act and react and, as a result, he will be called tactful, tolerant or diplomatic. Because of his insight, he does not push people around and it would be unwise to try to push him around.

Now that you know what to look for comes the denouement. We do not learn about these fundamental traits by reading the application blank or from one or even twenty personal interviews with the applicant. Aptitude tests do not tell us, nor do letters of recommendation. We learn only after he has been hired, by how he reacts in many and varied situations, by his impress upon others and by his results.

Chance plays such a great role in this problem of selecting good employees that if your score in hiring is fifty per cent or more, you may, with modesty, be proud of your accomplishment.

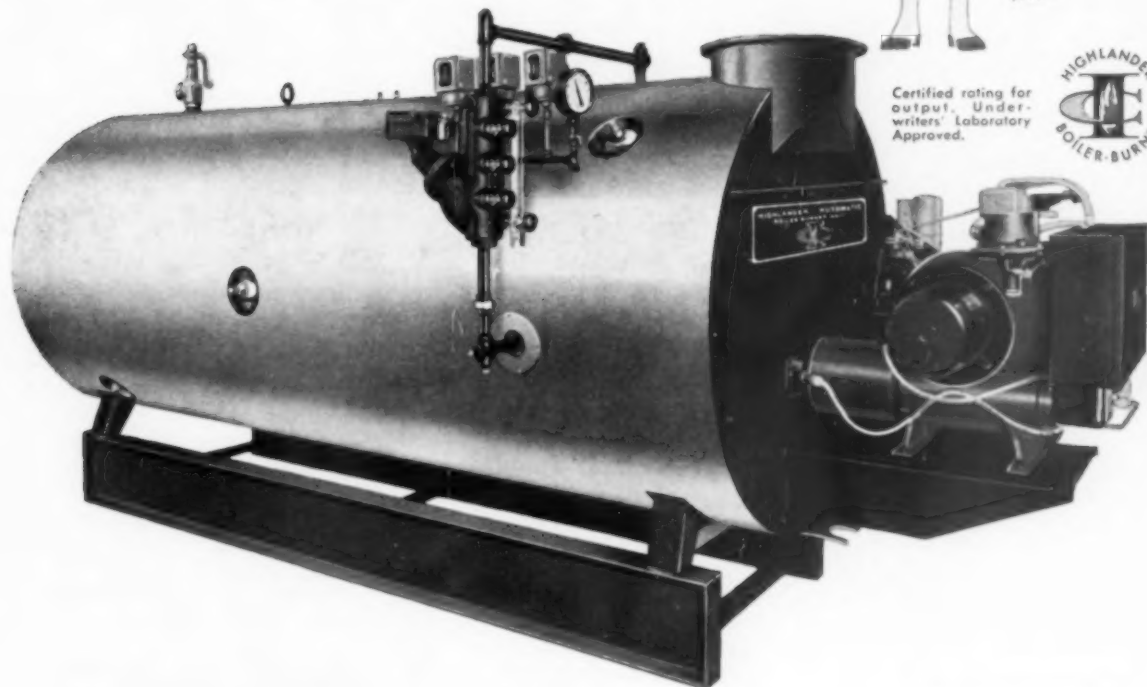
NEW

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output. Under-
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HEART OF THE HIGHLANDER is the famous Industrial Combustion Burner. The HEV-E-OIL Burner engineered to use inexpensive No. 4, 5 and 6 heavy oils is shown here. Available from 5 to 150 gph. HEV-E-DUTY Power Gas Burners and Combination gas/oil Burners from 720,000 to 21,000,000 BTU.

Write Dept. K-71 for complete information.

PROVEN ECONOMY

SAVES ON INSTALLATION. The new Highlander is a completely assembled boiler-burner plant. Installing one simple unit saves money. Designed by Engineers with years of experience in matching burners and boilers for the exact job — whether it is power, processing or heating. No problem of taking a boiler and trying to match a burner to it. The Highlander Boiler-Burner unit is design-controlled at the factory for maximum reliability.

SAVES ON OPERATION. Designed to get maximum economy from available fuels. The Highlander is built for low pressure or high pressure steam or hot water — Industrial Combustion burner furnished for a heavy oil, light oil or combination of gas/light or gas/heavy oil. Simple! Just 2 flue passes. Easy Maintenance! Boiler interior easily accessible. Reliable! Each burner is completely fire tested at the factory.

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INC.

EXECUTIVE OFFICES: 4447 N. OAKLAND AVE., MILWAUKEE 11, WIS.

A Cheaper Method for Well Cleaning

By E. L. DEAR

Associate Engineer

Mississippi Power & Light Company

ALL WATER to our steam electric generating station is supplied by deep wells — with the accompanying problem involved in high costs for cleaning the wells in order to maintain a constant supply. This has become more pronounced of course after 10 years continuous operation of the wells.

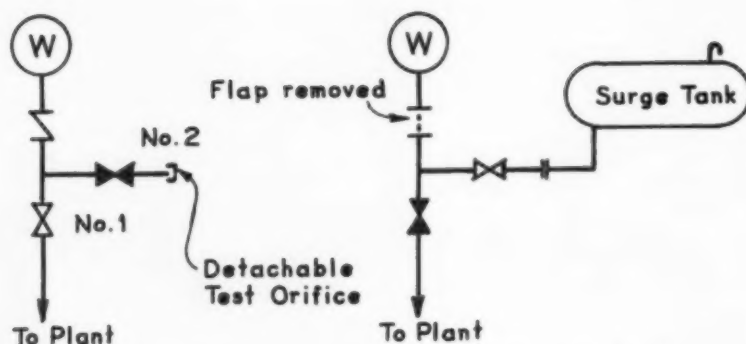
Plugged strata and clogged deep well pumps result from the fairly hard water involved. A typical analysis of this water: pH — 7.0; TDS @ 103°C — 365 ppm; Hardness (as CaCO₃) — 295 ppm; Free CO₂ — 65 ppm; P. alkalinity — "O" ppm; M. alkalinity — 313 ppm; chlorides — 50 ppm; and SiO₂ — 35 ppm.

Acid cleaning has been effective but costly. Consequently, we have devised the following rig for cleaning with sodium hexametaphosphate, a relatively cheap substitute.

As indicated in the sketch, the rig utilizes a portable 500 gallon surge tank with pipe and connections made from scrap well parts. The pump is isolated from the plant, check valve flap is removed, orifice cap is removed and the portable tank is coupled to the orifice pipe at the pump.

With valve No. 2 closed off, the cleaning charge is injected into the well through the check valve, and forced back into the strata with water pressure from the common well header by opening valve No. 1.

Valve No. 1 is then closed off, valve No. 2 is opened and charge is allowed to stagnate for two hours. Then a three hour agitation period



The pump and fittings are shown at left without the cleaning rig. Drawing at right shows how the surge tank is attached.

ensues during which the well is agitated by starting the pump and filling the surge tank, stopping the pump and allowing the tank contents to backflush into the strata. This is repeated in five to six minute intervals, and is done of course without ratchets or restrictions on the pump motor to prevent the pump from turning in reverse.

A twenty-four hour stagnation period follows, after which another hour of similar agitation is completed.

The well is then flushed (usually for twenty-four hours duration) to the plant sewer system immediately after the last surging. The well is then returned to service.

Since sodium hexametaphosphate cleans principally by dispersion rather than dissolution, the tank not only serves to amplify the backflushing but also, through the increased volume of flushing water, prevents the packing of dispersed deposits in the shaft bushings near the ground level. These particular bushings are apt to receive insufficient flushing during the agitation periods when not using a surge tank — with consequent lack of sufficient lubrication.

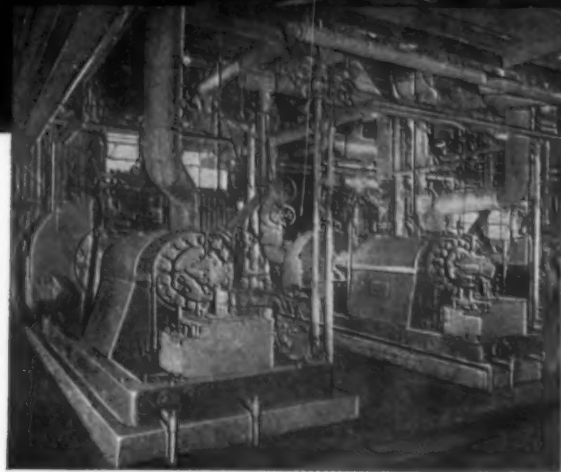
Results with this process have proved good. For instance, on one of our wells equipped with a 500 gpm, 6" turbine type pump (pump

depth 199 feet, well depth 328 feet) a charge of 400 pounds of sodium hexametaphosphate plus 5 pounds of wetting agent (soap powder) was used. This was dissolved in 100 gallons of water before injection for easier handling.

Measurement with free discharge indicated an improvement in drawdown of 33 feet plus an increase in pump output of 50 gpm. By comparison, this same well was previously cleaned with a charge of 130 gallons of 18° inhibited muriatic acid followed by a second charge of 600 pounds of sodium hexametaphosphate, and surged without the tank. Obviously much more time and agitating was involved in this combination cleaning. Total improvement in drawdown by the combination cleaning was 40 feet or only 7 feet better than the surge tank method.

This is not to recommend any particular chemical cleaning agent over another. We are familiar with sodium hexametaphosphate and we use it here only as an example. This article is presented mainly to point out the merits of utilizing a surge tank rig such as we have devised over not using one. The method outlined will amplify results whether using a "dispersion" or "dissolution" type chemical cleaner.

24 hour boiler-feed dependability
is a **MUST**
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Pacific Type BFI pumps feed the latest boiler installation to help provide 1 million 620 thousand pounds of steam per hour required for 58,875 KVA power generation and plant process steam. A similar Pacific boiler feed installation is in 24-hour operation at the West Virginia Pulp and Paper Company plant at Luke, Maryland.

The Charleston, S.C. paper plant (illustrated above) is one of the largest producers of pulp and paper in the United States. The pulp mill processes 3 million 100 thousand pounds of unbleached sulphate pulp every 24 hours. The paper mill turns out 2 million 800 thousand pounds of linerboard, unbleached and extensible paper every 24 hours and several by-products.

Obviously, it takes a tremendous amount of power and steam to handle a job of this magnitude. The latest boiler installation at this plant is fed by three Pacific Type BFI 4", 10-stage pumps which are on the job, around-the-clock—doing their part of the job.

Pacific boiler feed pumps are second to none—in design, quality, performance, dependability, plus unparalleled parts and engineering service.

Write for Bulletin 122-A

PACIFIC PUMPS

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HUNTINGTON PARK, CALIFORNIA, U.S.A.



BF-31

Air Compressor Valve Troubles

By H. B. McDERMID

NO AIR COMPRESSOR should be expected to function properly unless its valves are tight against leakage. Of the two valves usually found in each end of a compressor cylinder, the discharge valve is by far the most likely to get out of condition. It is subjected to the heat of the compressed air flowing through it. Furthermore, its leakage is most likely to cause real trouble, because pronounced discharge valve leakage increases the power required and thus puts an overload on all parts of the unit and drive.

Valve leakage, once started, is sure to rapidly increase as the hot air whistling through a leaky valve results in the surfaces becoming more and more cut and malformed. This action can go on until the unit is put out of commission, perhaps dangerously, if there is enough power in its drive arrangement to keep the machine dragging along in spite of overload. If the motor or engine is just powerful enough to operate the unit under normal conditions, it will puzzlingly stall when the discharge valve begins to leak, and thus indicate trouble.

Two examples come to mind which can be used to illustrate what happens in extreme cases of discharge valve leakage.

Case One

A 300 cfm compressor was flat leather belt driven from an electric motor which had plenty of reserve power. The operator was a careful man, who had started the unit as usual that morning and had been in its close vicinity for some two hours without noticing anything wrong. But it chanced that his duties took him elsewhere for a few minutes, and on his return he found the unit in a terrible condition.

The motor was overheated from the overload it was carrying, the discharge pipe was red hot, the double leather belt was threshing wildly, and the bearings were pounding. There was only one thing to do, so the operator jumped for the motor controls and shut off the power. Investigation showed a badly warped discharge valve and distorted seat, due to the intense heat developed, during the few minutes the machine had run after trouble developed.

Case Two

The other case of trouble occurred in a small vertical gas engine driven compressor, used to supply compressed air to a gang of riveters. Like on all such skilled operations wages of the men were high, and when the compressor quit at an air pressure of 75 psi, when the job demanded 110 psi, and could not be coaxed to do any more, the foreman was fit to be tied.

The unit was designed for small jobs like the one it had, and was built with its air cylinder mounted directly over the vertical gas engine. Both gas and air pistons were mounted on a common piston rod, and the unit looked good until it suddenly started to stall at very low air pressure.

The machine had a pressure controlled intake valve that normally kept the air pressure up to its working value, while the unit ran at constant speed. But now the whole thing just stalled completely at an unusable low pressure, with no other sign of trouble anywhere.

An engineer finally diagnosed the trouble as a leaky discharge valve, and subsequent examination proved this to be correct. In this case the driving power could not drag along the overload placed upon it, so the unit simply stalled.

Now to analyze these two examples, let us consider the action of a compressor when operating normally. As the piston moves away from the cylinder head, it sucks in air from the outside, until the piston reaches the end of its suction stroke, where the pressure of the air in the cylinder is usually somewhat less than that of the outside air. Then, with both the intake and discharge valves closed, the piston starts back on its compression stroke, the pressure in the cylinder gradually builds up until it becomes high enough to force open the discharge valve against the storage tank pressure, which occurs only when the piston is very close to the end of its stroke. Thus the full load on the compression stroke can be present only during a very small fraction of the stroke. Consequently the unit is designed to operate under those conditions.

But suppose the discharge valve leaks badly. Then, on the suction stroke the cylinder fills, not merely with cool outside air to a pressure less than atmospheric, but also with hot air it has just before compressed—and it fills to a very considerable pressure. Then the piston must start its compression stroke with a high initial pressure, which builds up to full discharge pressure at an early point in the stroke, depending on the severity of the discharge valve leak. And from that early point on to the end of the stroke, the compressor must labor under maximum pressure and load.

Then if the power is sufficient, as in Case One, high heat is very rapidly worked up to the ultimate near destruction of the valve parts and the complete cancellation of the compressor as a productive unit.

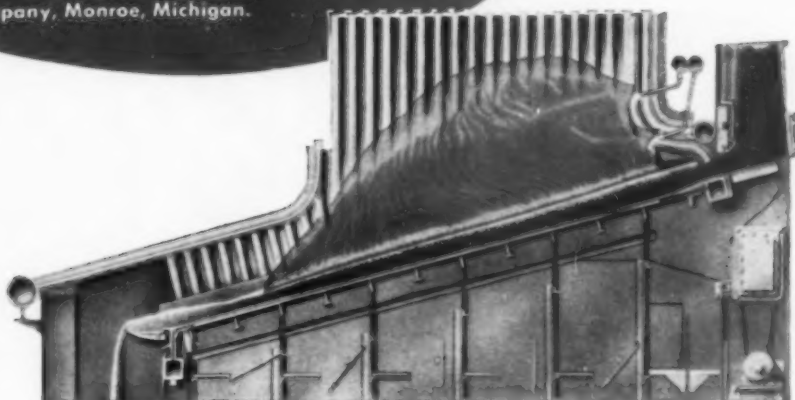
But if as in Case Two the power should be only slightly more than ample for normal operation, the unit merely stalls completely, and the operator has less damage on his hands. If the situation has been caught in time, refitting the valve parts will cure the trouble but the grief can be disconcerting to the novice before he finds his trouble.

The real cure of course is preventive maintenance — a proper schedule of inspection and repair that is diligently followed.

now it's

DETROIT VIBRA-GRATE STOKER *and* DETROIT-TAYLOR STOKER

Vibra-Grate and Taylor Multiple Retort Stokers formerly manufactured by American Engineering Company of Philadelphia are now and will continue to be manufactured, sold and serviced by Detroit Stoker Company, Monroe, Michigan.



DETROIT VIBRA-GRATE STOKER

All stoker activities of American Engineering Company, a division of United Industrial Corporation, have been transferred to Detroit Stoker Company, Monroe, Michigan where communications relating to all types of stokers formerly manufactured by American Engineering Company should be directed.

Vibra-Grate and Taylor Stoker users, present and future, will benefit through:

- Enlarged engineering and service staffs
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- District sales offices or representatives in more cities
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Owner: Western Hotels, Inc.
Electrical Engineer: Mr. Fritz Klawa, Portland, Ore.
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Electrical Protection is MODERNIZED with BUSS Fuses in the Multnomah Hotel, Portland, Ore.

In this well-known hotel of the Northwest, it became necessary to modernize the electrical system to take full advantage of the many uses for electricity today.

BUSS Hi-Cap and FUSETRON dual-element fuses were installed to assure safe, dependable and lasting protection.

This installation is another example of the modern trend in electrical protection. Architects, engineers and plant operating men are finding no other type of protective device can equal fuses for high-interrupting capacity and lifetime, maintenance-free dependability.

FUSES PROVIDE HIGH INTERRUPTING CAPACITY at a very low cost

FUSETRON dual-element fuses have an interrupting rating of 100,000 ampere rms symmetrical—and for the protection of mains or circuits above 600 amperes, BUSS Hi-Cap fuses are designed to safely interrupt 200,000 ampere rms symmetrical.

Thus, they can safely interrupt fault currents now available,—and are adequately safe to allow for future system growth.



Mr. J. Wesley Birch, Manager of Pitman Electric Co. at main switch board which is equipped with BUSS Hi-Cap and FUSETRON dual-element fuses.

WITH FUSES, SAFE PROTECTION REMAINS SAFE WITHOUT MAINTENANCE OR RECALIBRATION COSTS

After years of inactivity, fuses will provide the same safe, accurate protection if called upon to open as they would on the day installed.

Fuses have no hinges, pivots or contacts to stick or get out of order. Dust, fumes, corrosion or age cannot increase the capacity of fuses or lengthen their blowing time.

For more information:

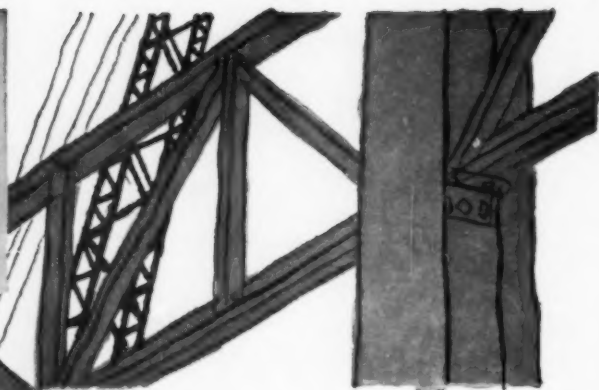
Fusetron dual-element fuses.....write for bulletin FIS
BUSS Hi-Cap fuses.....write for bulletin HCS

BUSSMANN MFG. DIVISION, McGraw-Edison Co.
University at Jefferson, St. Louis 7, Mo.

If you need fuses with long time-lag to prevent needless blows, plus 200,000 amp interrupting capacity, plus extreme current-limitation—use BUSS LOW-PEAK fuses. Ask for BUSS bulletin LPCS.



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the Payroll
Savings Plan..."**



"It fitted into our operation perfectly..."

"I had an idea it might be a bit complicated to install the Payroll Savings Plan. Seeing all our people, explaining how it operates, pointing out its advantages. But the way it worked out it was simplicity itself."

"All we did was contact our State Savings Bonds Director. He outlined the campaign for us, working through the bond officer we appointed. A short, company-wide person-to-person canvass was set up—and the results were absolutely amazing. Some of our people told us later that since they found out how convenient it is to save *regularly* through the Payroll plan they have actually increased other investments, too!"

When your company has a flourishing Payroll Savings Plan for U.S. Savings Bonds, participating employees have the added satisfaction of helping to keep America strong.

For prompt, friendly help in setting up a Payroll Savings Plan in your organization, contact your State Savings Bonds Director. Or write Savings Bonds Division, U.S. Treasury Department, Washington, D.C.



ALL U.S. SAVINGS BONDS—OLD OR NEW—EARN $\frac{1}{2}\%$ MORE THAN BEFORE



SOUTHERN POWER & INDUSTRY



THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

Steam Traps

(Continued from page 69)

call, the repairman can carry with him three sizes of traps, and know that one will fit.

Standardizing on traps also keeps the cost of spare parts inventory to a minimum. By purchasing only high-quality traps, the user is assured of longer, maintenance-free performance.

Provide a shop where the traps can be cleaned and repaired. It should have provision for completely testing the trap performance after repair. This necessitates a steam line capable of delivering different pressures, with an accurate pressure gauge. When checked out, the repaired trap can be tagged and put on the shelf as a spare.

Experience will show how many additional spare traps to keep in your stock. The savings in downtime will be appreciable in the long run . . . much greater than the investment in the "spares."

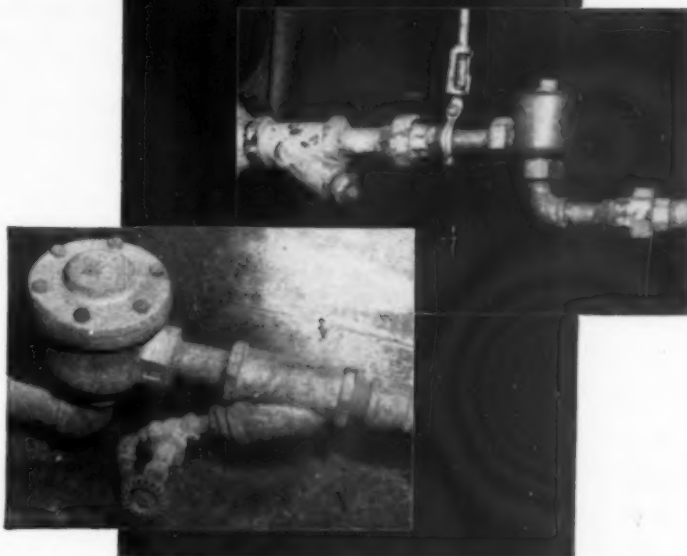
Corrosion

Most steam trap and strainer troubles are caused by normal wear or by corrosion in the return lines. Corrosion is a big problem in steam systems, where it is caused by entrained carbon dioxide or an acid condition in the condensate, again caused by CO_2 reaction. Check the condensate; the pH should be 9. If it's below pH 7, it should be treated by an expert.



Consider These Facts about THERMOSTATIC TRAPS

TO ASSURE HIGH EFFICIENCY AND
LOW MAINTENANCE



Every trapping requirement cannot be met with one trap. Consequently Anderson manufactures a complete line of traps including the remarkable Quik-Flex Thermostatic Steam Trap. From one source you can meet all your trapping needs. If you are using or planning to use thermostatic traps, consider these important facts — features built into every Anderson Quik-Flex Trap.

- Large capacity covering a wide pressure range simplifies specifications.
- Only one moving part assures low maintenance and less downtime.
- Fast heating up of units through quick discharge of condensate and/or air.
- Guaranteed freeze-proof when properly installed and operated for outdoor operation.
- Compact design permits simplified piping in hard-to-get-at places.
- Immediate delivery is guaranteed from inventory.

Write FOR COMPLETE INFORMATION AND BULLETIN 257
DESCRIBING THE ANDERSON QUIK-FLEX THERMOSTATIC TRAP.



SUPER SILVERTOPS STEAM
TRAPS
BY THE MANUFACTURERS OF Hi-eF PURIFIERS

THE V. D. ANDERSON COMPANY

Division of International Basic Economy Corporation
1966 West 96th Street • Cleveland 2, Ohio

Southern News Briefs (Continued)



Airplaco Expands K. C. Plant

Air Placement Equipment Company, 1000 West 25th St., Kansas City, Missouri recently completed the first phase of an expansion program at its manufacturing plant.

A modern split-level office building connects directly with the company's fabrication plant and machine shops at the 42,000 square foot site. Manufacturing facilities have undergone extensive expansion and realignment, including an additional 5,000 square feet of working space.

The company produces 34 different units to meet the construction industry's need for all types of concrete gunning, mixing and placing operations. H. L. Kalousek is president of Airplaco.

PLANT PERSONNEL

Plant Manager of Clark-Schweibel Fiber Glass Corp.'s new multi-million dollar operation at Anderson, S. C., is **Tyrus O. Jones**, former production manager of United Merchants & Manufacturers' glass weaving plant.

James M. Swilly has been named production manager of Niagara Chemical Division's new pesticide formulating plant at Dothan, Alabama. Mr. Swilly was previously a foreman at Niagara's Jacksonville, Florida plant.

St. Joe Paper Company's new container manufacturing facilities to be built in Birmingham, Alabama, will be staffed by **William L. Tharpe** as general manager; **L. C. Houston** as sales manager; and **Fred Forbis**, production manager.

General manager of Trinity Steel Company's new Transport Division at Dallas, Texas, is **Dick Martin** who

was formerly with Black, Sivalls & Bryson in Oklahoma City and later with Delta Tank in Baton Rouge.

Dr. Nicholas Fuschillo has been appointed head of the Solid State Physics Section of Melpar, Inc., at Falls Church, Virginia. The electronics and development firm is a subsidiary of the Westinghouse Air Brake Co.

Fischer S. Black has been promoted to executive vice-president of Tampa Electric Company. Mr. Black, a native of North Carolina, has been vice-president-administrative of the company since 1959.

Succeeding **C. T. Kastner** as manager of the General Electric Company's plant at Hickory, N. C., is **Karl F. Lathrop**, formerly of Schenectady.

Bohn Heads Todd Products Division

William H. Bohn has been appointed General Manager of the Products Division of **Todd Shipyards Corporation** at the headquarters of the Division, Columbia & Halleck Streets, Brooklyn, N. Y. This is Todd's initial step in a program for increased participation in the industrial and marine combustion equipment markets, including expansion of manufacturing and distribution, and additional products. Todd presently manufactures oil, gas and combustion burners, package burner units, industrial air heating units, fuel atomizers and insecticidal fog applicators.

Working with Mr. Bohn to form the management team responsible for the success of Todd's new program are **J. A. Hayes, Jr.**, Sales Manager — Marine Products, **M. E. Prowler**, Sales Manager — Industrial Products and **M. G. Magoulas**, Service Manager.

Niagara Chemical Div. Establishes Ala. Plant

A new plant at Dothan, Alabama, has been established by **Niagara Chemical Division of Food Machinery and Chemical Corporation**. The unit will produce insecticide and fungicide formulations for the cotton, peanut, peach, tobacco, soybean, and vegetable crops of Southeastern Alabama, Northwest Florida, and Southwest Georgia.

Situated in an existing 16,000 square foot building on Alabama Highway 53, the plant contains the most modern blending and mixing equipment.

General Electric Promotes Dan C. Kyker — N. C.

Dan C. Kyker of Atlanta has been appointed manager of materials for the **General Electric Company's** Outdoor Lighting Department at Hendersonville, North Carolina. In the newly created post, Mr. Kyker is responsible for purchasing, shipping and receiving operations.



For the past eight years Mr. Kyker has been a sales representative of the G-E Electric Utility Sales Operation in Atlanta. A native of Tennessee, he attended the University of Tennessee and Georgia Tech. He has a B.S. degree in electrical engineering. He joined G. E. in 1946 at Schenectady, and was transferred to Atlanta in 1953.

Mr. Kyker has been active in Atlanta civic and professional organizations. He served as president of the Atlanta Jaycees, 1959-60; chairman of the Georgia Section, American Institute of Electrical Engineers, 1960-61; program chairman of the Georgia Engineering Society, 1960; and president of the Greater Atlanta Georgia Tech Club, 1959-60.

L. B. Foster — Houston

G. W. Campbell has been appointed sales representative in the Houston office of **L. B. Foster Company**, national supplier of steel sheet



piling, pipe and rail and track accessories.

Mr. Campbell, a graduate of the University of Texas, was previously vice-president of Kane Pipe Corp., Galveston, with whom he was associated for 15 years.

Lansing Co. Announces New Representatives

Lansing Company, Lansing, Mich., manufacturer of material handling equipment, announces the following representative appointments:

R. H. Welsome and Associates, Atlanta, Georgia for Alabama and Eastern Tennessee; T. M. Cox Company, Memphis, Tennessee for Mississippi, Louisiana, Arkansas and Western Tennessee; Ralph E. Miller and Associates, Kansas City, Missouri for the territory including Missouri and Kansas.

Allis-Chalmers Agencies Texas and Tennessee

The Electric Service Co., 926-32 Pulliam St., San Angelo, Texas, has been appointed an agency for **Allis-Chalmers** feeder voltage regulators, power transformers, switchgear, unit substations, and circuit breakers in Tom Green County. A. R. Schantz is president of Electric Service and W. W. Jackson is sales manager.

Leinart's, Inc., 412 Fifth Ave., N.E. Knoxville, Tenn., has been named agent for **Allis-Chalmers** water conditioning equipment in an area that includes several counties in Tennessee, Kentucky, and Virginia. Byron H. Leinart is president and treasurer of the firm, and Jack R. Mynatt is sales manager.

DO YOU KNOW
WHAT
METALLIZING
CAN DO
FOR YOU TODAY?



*With today's improved metallizing materials and methods:
Plant executives find new ways to slash maintenance costs, reduce downtime, cut machine parts inventory...*

These real-life examples show how plants save money with metallizing:

Necks of winding rolls in a textile mill were formerly repaired by a slow machining method, requiring highly skilled labor. Now the worn necks are built up with flame sprayed metal, quickly machined to size. Savings run \$20,000 a year.

Valve plugs and seats, working in sand, oil and salt water, lasted only a few hours in service. Hard-faced by welding, a set cost \$155, lasted from 3 to 8 hours. When flame sprayed with tungsten carbide powder, service life was increased to a minimum of 2 weeks, 4100% longer! Cost of metallized set, \$73. But reduced downtime far outweighs the dollar savings.

A Connecticut company was sending its worn shafts out for repair by welding at a cost of \$50 each. Then they found a local shop that specialized in metallizing was able to do a better job for \$27.50. The same job shop salvaged a big degreasing tank, value \$2,850, by flame spraying with zinc for \$683. The shop made money, the customer saved money.

A shipbuilding company installed metallizing equipment to repair such parts as pump rods, pistons, crank shafts for diesel engines, stern bush-

ings, valve stems. A badly worn tugboat shaft, replacement cost \$3,000, was repaired and made better than new for \$400. That job alone more than paid for the METCO equipment.

From these cases you can see how modern metallizing pays, whether in plant maintenance departments or in job shops serving the many companies that don't need their own installation. Wherever there's wear, in rotary or sliding action, there's an opportunity to save money and make money.

New and improved materials

Among these new materials are a number of nickel, chrome, boron hard facing powders. Sprayed tungsten carbides are also widely used. Many others are available to give new values to the basic benefits of metallizing, which may be summarized as: less downtime; far less machining or grinding time, reduced parts inventory; and "better than new" performance of the metallized parts.

With savings like these there are big opportunities for more efficient maintenance operations, either with METCO installations or through local job shops.

To explore these advantages and see how they apply to your operation, check the coupon below and send it off today.



METCO INC.

FORMERLY METALLIZING ENGINEERING CO., INC.

Flame Spray Equipment and Supplies

2035 Lafayette St.

New Orleans 16

Tel. EXpress 3232

Mr. Walter Gagnet Jr. • Metco Inc.
2035 Lafayette St., New Orleans 16, La.

Dept. 5

How to
SAVE MONEY
and cut
downtime
with
Metallizing

- ☐ Send copy of Bulletin 15, "How to Save Money and Cut Downtime with Metallizing"
- ☐ Have Field Engineer Call

Name _____

Title _____

Company _____

Address _____

City _____

Zone _____

State _____

Southern News Briefs (Continued)

Rockwell Mfg. — El Paso

Thomas J. Williams has been appointed branch manager of **Rockwell Manufacturing Company's** El Paso, Tex., office. He will be responsible for meter and valve sales in west Texas and southern New Mexico.



Mr. Williams joined Rockwell in 1954 as a sales engineer in the Tulsa district. From 1949 to 1953 he was Rockwell's Tulsa representative for Edward Valves. He attended Louisiana State University, Centenary College and the University of Houston.

Edward Valves — Carolinas and Eastern Tennessee

Bertram W. Allen, district manager for **Republic Flow Meters Co.**, with headquarters at Charlotte, will now also cover North Carolina, South Carolina, and eastern Tennessee for **Edward Valves, Inc.**, according to Lee A. Colbath, Atlanta district manager. Both companies are subsidiaries of Rockwell Manufacturing Company.

Mr. Allen is a member of the American Society of Mechanical Engineers, the Instrument Society of America, and the North Carolina Society of Engineers. He was graduated from the University of Florida in 1948 with a mechanical engineering degree.

Robertshaw-Fulton Div. Announces Appointments

Robertshaw-Fulton Sylphon Division, Knoxville, Tenn., has appointed one new district sales manager and four sales engineers.

John P. Balke, who has had 13 years in sales engineering, has been named district sales manager for the division's new office in St. Louis, Missouri. Mr. Balke is a graduate of

Missouri School of Mines and Southwest Missouri State College. Before joining Robertshaw, he was associated with the Powers Regulator Company.

Mack K. Jacobs, a sales engineer for the Southern Texas area, has his office in Houston. Mr. Jacobs, a graduate of the University of Texas, was formerly employed by Humble Oil and Refining Company, and by Minneapolis-Honeywell.

John C. Dwyer is a sales engineer in the Baltimore, Maryland, office of Fulton Sylphon.

At the division's Knoxville plant, Thomas J. Fisher, who was formerly associated with Minneapolis-Honeywell as an applications engineer, is now a sales engineer. J. C. Cate, whose previous experience includes employment by Texaco, is now a junior sales engineer.

Zurn — Tulsa & Baltimore

Zurn Industries, Inc., designers and producers of pipe line strainers and related devices, announce the appointment of the Hako-Hearn Engi-



H. A. Hearn

neers as sales engineers in the Tulsa, Oklahoma area for the company's Fluid Control Div.

Located at 201 Enterprise Bldg., Sixth and Boston, Tulsa, Oklahoma, the newly-named office is staffed by Herschell A. Hearn and three associates: Leroy Wetzel, James Dyer, and James Robertson. The organization has had 25 years of experience.

The Cummins-Wagner Company, 601 East 25th St., Baltimore, Maryland, has been appointed to represent the Fluid Control Div. of **Zurn Industries, Inc.**

The office is staffed by Charles A. Cummins, II, and Charles E. Wagner. Both have had extensive experience in the fluid control sales and engineering field. They will serve the Baltimore region.



Bill W. Parsons



R. A. Teague

T. B. Wood's Sons Co. Charlotte — Raleigh

T. B. Wood's Sons Co., Chambersburg, Pa., recently created a Charlotte-Raleigh sales district, headed by Bill W. Parsons as district sales manager.

Mr. Parsons will concentrate his efforts in central and western North Carolina and northern South Carolina, and will also oversee the activities of the Raleigh territory. He is a graduate of Clemson College, and has been with Wood's since 1957.

Richard A. Teague, as a field sales engineer, assumes responsibility for the Raleigh territory which includes the eastern half of North Carolina and eastern and central Virginia. Mr. Teague is a graduate of North Carolina State.

Shallcross Elects Two V. P. — Selma, N. C.

Shallcross Manufacturing Company, Selma, N. C., has announced the election of John E. Lillich as vice-president in charge of manufacturing, and Clement W. Sharek as vice-president in charge of engineering.

Early in 1960 Mr. Lillich joined Shallcross as production manager, and Mr. Sharek joined the company as chief engineer. Formerly, both

had been with the Electronic Components Division of Corning Glass Works.

The newly created posts are part of the company's expansion program for its line of precision wirewound resistors, rotary switches, delay lines, and laboratory instruments.

Honeywell — Atlanta

Appointment of J. E. MacConville as a sales coordinator for its Special Systems division has been announced by **Minneapolis-Honeywell Regulator Company**. Mr. MacConville, with headquarters in Atlanta, will be responsible for the sale and installation of military systems in the Southeastern United States. He joined Honeywell in 1930, and transferred to Atlanta as branch sales manager in 1949.

Fred B. Akerson succeeds Mr. MacConville in his most recent position as regional industrial sales manager in Atlanta.

Electronic Tube Corp. Southern Representative

James L. Highsmith & Company has been named Southern sales representative for the **Electronic Tube Corporation**, 1200 E. Mermaid Lane, Philadelphia, manufacturer of special purpose cathode ray tubes and oscilloscopes.

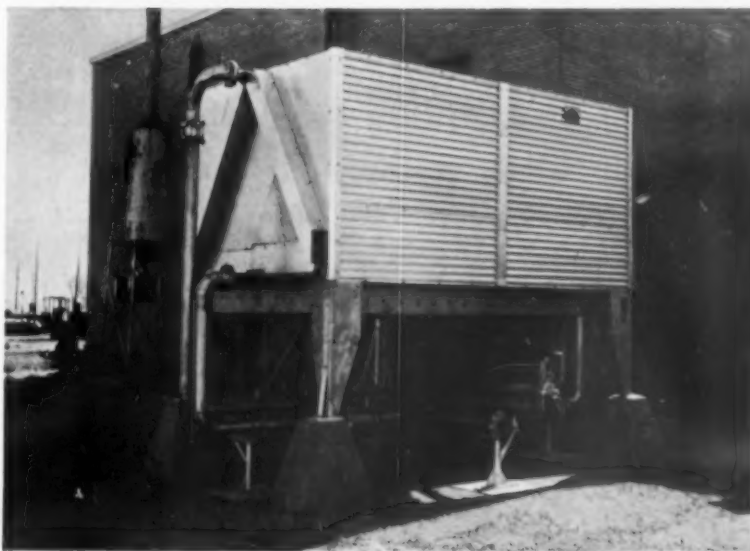
From headquarters in Charlotte, N. C., and branch offices in Huntsville, Ala., and Richmond, Va., the Highsmith organization will handle ETC sales in Virginia, West Virginia, the Carolinas, Georgia, Alabama and Tennessee.

Black & Decker — Charlotte

The Industrial-Automotive Division, **The Black and Decker Manufacturing Company**, has formed a new sales district comprising North and South Carolina. Floyd W. Cowan has been named district sales manager with headquarters at Charlotte.

Mr. Cowan, who was formerly sales representative in the Atlanta district, started with Black & Decker in 1948 as a repairman and advanced to service engineer, then sales representative. Black & Decker Industrial-Automotive sales representatives assigned to the new Charlotte district, under Mr. Cowan's supervision, are Norris C. Keller and Steve J. Deviney.

NEW ECONOMY NEW FLEXIBILITY in *Closed Circuit Cooling*



Marley

DriCooler® Fluid Coolers

Marley DriCoolers have become the modern approach to closed-circuit cooling of recirculated clean fluids by air . . . because they keep costs and temperatures under *complete control*.

DriCoolers are specifically designed to meet industry's varied needs for high level cooling at low costs. They are engineered to combine a high standard of heat transfer capability with economical use of applied horsepower, long service life and conservative first cost. DriCooler controls provide automatic operation in all seasons, in any climate.

This combination of positive characteristics makes DriCoolers the logical cooling equipment for modern machines and processes—engine jacket water . . . electronic tubes and data processing equipment . . . furnace doors . . . molding and extruding equipment . . . air compressors . . . welding equipment . . . anodizing tanks . . . quenching baths . . . transformers . . . many process requirements.

For complete details on DriCoolers—or on Marley's complete line of water cooling towers—see your Marley engineer or write direct. You'll find that Marley helps you make the most profitable use of your logical cooling medium, whether it be air or water.

Ask for Bulletin DFC-61.

the **Marley company**
Kansas City, Missouri



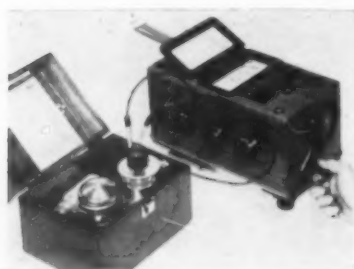
NEW Product Briefs

... there is always a **BETTER WAY**

FOR MORE INFORMATION ON FOLLOWING ITEMS Fill in Code Number on Return Card — Page 85

Test Cell Kit for Liquids

F-1 A complete kit for use with a Megger insulation tester in making measurements of the resistivity of liquids, such as transil oil and insulating varnishes has been announced by



James G. Biddle Co., 1316 Arch St., Philadelphia 7, Pa.

The Biddle-Balsbaugh Cell has been packaged as a kit with a jar for storing the cell free from contamination while not in use. The jar holds appropriate solvents and a spring fixture for securing the cell when it is immersed in the solvent between tests. The three test leads supplied, have insulation for test voltages up to 5,000 volts d-c.

Acid Resistant Interior Stack Coating

F-2 Benjamin Foster Company, 4635 W. Girard Ave., Philadelphia 31, Pa. is now marketing Stackfas — a new and highly effective corrosion resistant product for the interior of brick, steel and concrete chimneys. Stackfas has been described as the world's first corrosive resistant material proved effective against the acids formed by sulfur dioxide, sulfur trioxide, hy-

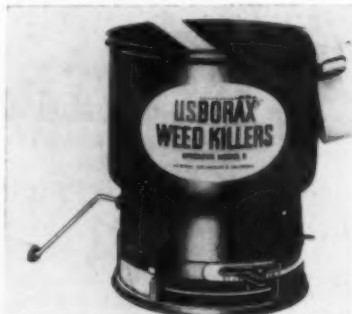
drogen chloride and hydrogen fluoride.

The twenty-four major public utilities, chemical and industrial plants that cooperated in testing the new products are located in all sections of the United States. In all areas, the heat resistance, acid resistance and fly ash abrasion resistance of Stackfas was rated as outstanding. Tests were made with all types of chimneys: concrete, steel, brick lined, gunited metal, etc. Operating conditions were with both positive and negative pressures. As a result of these tests, important new information was learned which can and will drastically reduce the spiraling maintenance and repair costs of industrial chimneys.

Industrial Herbicide

F-3 United States Borax & Chemical Corporation, 1308 Wilshire Blvd., Los Angeles 17, Calif., is introducing a new industrial herbicide with a wider range of weed killing potency. Known as Ureabor 31, it has been field-tested for four years on industrial sites in 26 states and Canada.

The new formulation is available in easy-to-apply granular form and was developed specifically for industrial use. Ureabor 31 kills fire hazard-

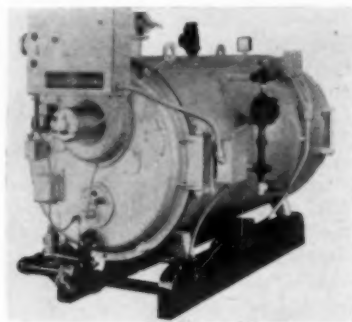


ous weeds in a single treatment and provides maintenance-free surface for a year or longer. A more concentrated formulation (Ureabor 62) is also available.

The Spreader illustrated here is designed for easy, accurate and economical application of granular, industrial and agricultural weed killers. According to U. S. Borax company officials, one filling will cover up to 5,000 square feet at a rate of 1,000 square feet per minute. It is priced under \$15.

Automatic Boiler

F-4 A new packaged boiler, combining operational simplicity with fully automatic controls is announced by Cleaver-Brooks Co., 326 E. Keefe Ave., Milwaukee 12, Wisc. Designated the



CBH, the fire tube boiler was developed because of the increased use of gas as a primary fuel for boilers of 50-100 horsepower.

The CBH series, from 25-100 horsepower, is available in models that can be fired by gas, No. 2 oil, or combination of gas and light oil. It can be used for steam, 15-250 psi, or hot water systems. CBH boilers have both a high and a low firing rate, and change automatically from one to the other in response to load demands. An electronic programmer shuts down the burner in case of flame failure and also purges the boiler of fuel vapors both before and after each firing cycle. Guaranteed minimum efficiency is 80 per cent.

Fused Switch Gear for High-Voltage Circuits

F-5 Developed to protect 2400- to 13,800-volt distribution circuits at moderate cost, New Type DFS drawout fused, metal-enclosed switchgear is avail-



able from **Westinghouse Electric Corporation**, Box 2099, Pittsburgh 30, Pa.

It is intended for commercial, institutional, light industrial, and other applications which require compact, reliable protective equipment but do not require the use of circuit breakers. Catalogued as load-interrupter switchgear, it is built around a drawout design in which the switch-and-fuse element is withdrawn from the enclosure whenever fuses are to be replaced or switch contacts inspected.

Tank Lining

F-6 Extruded Penton sheet in 48-in. wide rolls is now available for lining tanks, vessels, and other equipment, announces **National Vulcanized Fibre Co.**, 1060 Beech St., Wilmington 99, Delaware. Formerly, the material was only commercially available in narrow widths. "Penton" is Hercules Powder Co.'s trade-mark for chlorinated polyether.

The use of Penton linings is a practical means of incorporating corrosion and abrasion resistance in many kinds of equipment operating in moderate to severe corrosive environments. This lining material has a wide range of chemical resistance at elevated temperatures. It is used in the chemical, metalworking, pulp and paper, tanning, petroleum refining, textile and other industries.



Chemicator...

for simple automatic chemical control of cooling water

The Chemicator is specifically designed for automatic control of scale, corrosion and slime in cooling towers and evaporative condensers.

Simple, trouble-free design, has no moving parts or expensive electrical installation, yet gives positive low-cost control with savings up to 75% over usual methods. Complete satisfaction guaranteed.

Call CEdar 3-4162, Atlanta, Georgia, collect

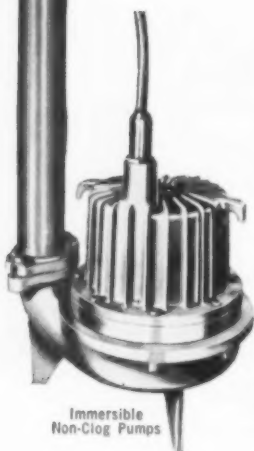


LABORATORIES, Inc.
2710 APPLE VALLEY ROAD
ATLANTA 19, GEORGIA
Member of Associated Laboratories, Inc.

here's why **most plant engineers prefer WEINMAN PUMPS**

Handling of liquids . . . for heating, cooling and processing . . . is an important facet of modern manufacturing. The tremendous volume of fluids handled prompts today's industrial engineer to find ways of insuring a steady flow of vital liquids to and from the job. That's why more and more engineers are turning to Weinman to meet their precise pumping requirements. And, they find plenty of reasons to back their buying decision:

- 1 **WEINMAN EXPERIENCE.** More than 50 years of pioneering developments that are today's standards assures you of the right pump for each job.
- 2 **COMPLETE PUMP LINE.** Every type of centrifugal pump to meet any pumping need. You're sure that the pump you buy is the best pump for the job.
- 3 **QUALIFIED RECOMMENDATIONS.** Made after a careful analysis of your present and future pumping needs. You get the pump that fits your job today and tomorrow.
- 4 **SIMPLE DESIGN AND RUGGED CONSTRUCTION.** Weinman Pumps are built for easy maintenance and long, trouble-free service.
- 5 **INSTALLATION AND SERVICE.** You get skilled assistance before, during and after installation to insure proper operation twenty-four hours a day.



Immersible
Non-Clog Pumps

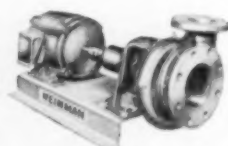
When you're faced with a pumping problem . . . get the right answer from your Weinman specialist . . . you'll find his name in the Yellow Pages. Or, write to us.



General Service
Unipumps



Split Case,
Multi-Stage Pumps



Single Stage,
End Suction Pumps

THE WEINMAN PUMP MFG. CO.
290 SPRUCE STREET COLUMBUS 15, OHIO
CENTRIFUGAL SPECIALISTS

New Products (Contd.)

Arc Welder

F-7 A new portable, medium-duty a-c arc welder designed for small scale production and maintenance welding has been added to the Murex line by



Metal & Thermit Corporation, Rahway, N. J.

Designated Model M 18 T-1, the 180 ampere, compact unit is mounted on heavy-duty wheels and can be moved easily. Full 80-volt open circuit voltage allows welding with all types of electrodes from 1/16 to 3/16 inch in diameter.

KEEP UP-TO-DATE USE SPI READER SERVICE

See Pages 85 & 86

Metal Cutters

F-8 **H. K. Porter, Inc.,** Somerville 43, Mass., is offering a new complete line of hand-hydraulic cutters for everyday, tough metal cutting jobs in industrial plants.

Remote control enables cuts to be made safely on the ground, in the air or underground. Cutting blades are drop-forged and induction hardened to withstand pressure and give long blade life. Ram is adjustable to compensate for wear on cutting blades. A special pneumatic cutter is available for 3/4" diameter and smaller metal and plastic. This Model 9190C needs only 80 to 100 psi air supply.

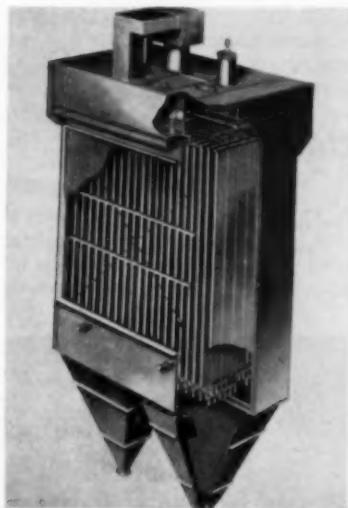
X-Ray Unit

F-9 **Pickering X-Ray Corporation**, White Plains, N. Y., has developed for industrial inspection a new x-ray image amplifying technique that increases by five times the previous limits of effective fluoroscopic magnification and yields a clearer picture, the company announced.

The discovery means that the growing field of non-destructive industrial testing by x-ray will be improved materially and expanded to include smaller products. A broad variety of inspection problems involving interior defects in parts or assemblies can be solved with the new technique which is called "Super Magnification."

Electrostatic Precipitator

F-10 A new electrostatic precipitator which features high collection efficiency for any dust collection application is now available from **American-Standard Industrial Division**, Detroit



32, Michigan. The new units are custom built to suit the job, utilizing modular construction techniques to the fullest extent.

High efficiency is achieved through use of a flat collector plate design. The plate contains "pockets" which trap and hold the dust, reducing the chance of re-entrainment. The high efficiency of the design allows its effective application under difficult conditions where resistivity is high.

It's the "law"!

(ASME Power Boiler Code)

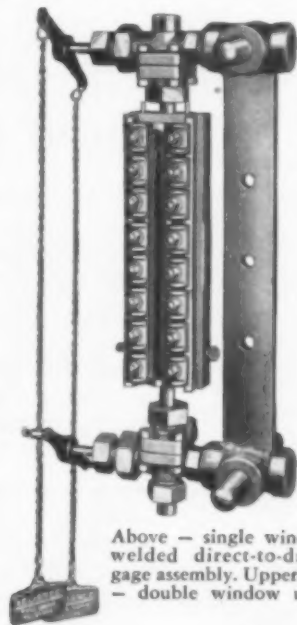
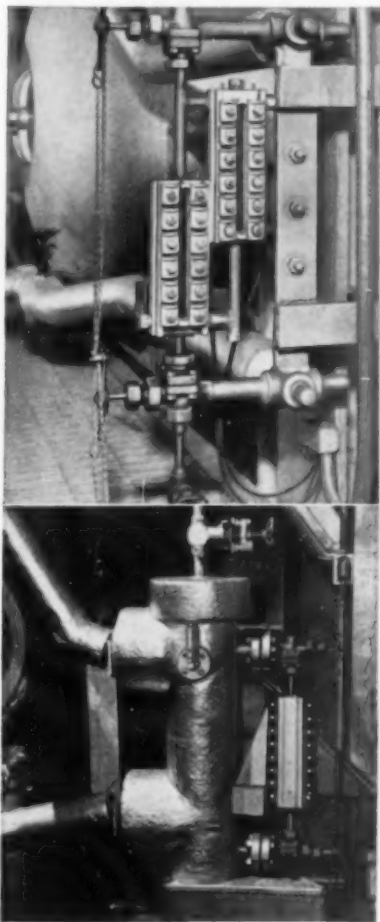
Reliance reminds you of an important rule

Remember that the Boiler Code requires the use of *two water gages* per boiler on installations operating at 400 psi or over (Par. P-291). You can comply by using one of these combinations:

1. provide two water columns, one at each end of the drum — a gage on each.
2. one water column having two sets of gage connections; use "twin" gages.
3. one column at one drum end, and a direct-to-drum water gage assembly at the other.
4. two direct-to-drum assemblies, one on each end of the drum.
5. use one conventional gage, either direct-to-drum or on water column, and two manometric-type remote gages (the Reliance EYE-HYE) if operating over 900 psi. (Case No. 1155.)

The combination you choose needs only to meet connection rules of the Code — besides, of course, the use of column and gage equipment of adequate capacity and conforming to the general rules of the Code covering materials and welding.

You can be sure of complete safety and Code conformance when you specify Reliance Water Column and Gage Equipment. It has been accepted as "standard" by boiler manufacturers and consultants for 75 years. Standard and custom-built products for every pressure range. Check with your consultant, or call in the Reliance Representative for your area.



Above — single window welded direct-to-drum gage assembly. Upper left — double window unit.

THE RELIANCE GAUGE COLUMN CO. • 5902 Carnegie Avenue, Cleveland 3, Ohio

Reliance®

BOILER SAFETY
DEVICES



Take the legwork out of liquid measurement

Here's practical liquid measuring—the modern way...without roaming all over the lot! Liquidometer Gauges let you inventory distantly stored liquids at a glance.

Completely automatic Liquidometer Gauges can be located as far as 250 feet from tanks. Think what this centralized system can mean in man-hours saved—let alone the additional safety of personnel who no longer have to trudge to, or tamper with, hard-to-get-at tanks.

Simple to install, and requiring no maintenance, Liquidometer Gauges measure virtually all liquids conveniently, continuously, and correctly. There's a type available for practically every liquid measuring application.

For complete details, write



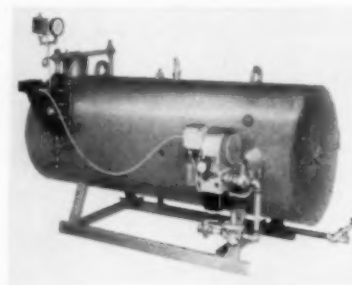
THE LIQUIDOMETER CORP.

Dept. F, LONG ISLAND CITY 1, NEW YORK

New Products (Contd.)

Side-Fired Boiler

F-11 Eclipse Boiler Division, Eclipse Fuel Engineering Co., Chattanooga 5, Tenn., has announced a new line of compact economy boilers, designed with the burner mounted at the side to reduce floor space requirements.



The new boilers are available in gas, oil, or combination gas/oil fired models, rated at 6, 12, 16, 20, and 30 hp. They operate from 201,000 to 1,005,000 Btu/hr output, at 100 or 125 lb standard working pressure, and are available to 500 lb working pressure.

Horizontal design puts all tubes below the water line to prevent corrosive action of oxygen and carbon dioxide.

Circuit Breaker

F-12 A new 800-ampere molded case circuit breaker—which provides one-third saving in panel space—has been announced by **I-T-E Circuit Breaker**



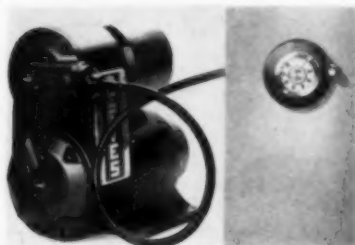
Company, 1900 Hamilton St., Philadelphia 30, Pa.

The new KM frame breaker (shown here at the left in photograph) is smaller than its LM predecessor (right) by one frame size, and provides exactly the same electrical features and ratings.

It is available in two- and three-pole construction in current ratings of 125 through 800 amperes, for 600 volts a-c and 250 volts d-c.

Remote Control for Drive

F-13 The Reeves Pulley Division of **Reliance Electric and Engineering Co.**, 24701 Euclid Ave., Cleveland 17, Ohio, has developed a mechanical remote con-



trol for changing output speeds on its variable speed "Motodrives."

The remote unit consists of a flexible shaft and an indicator handwheel. The handwheel is turned to change speeds, and has a dial on its face to indicate the speed setting. The handwheel is designed for panel or wall mounting, and a bracket is available for machine or free-standing mounting.

KEEP UP-TO-DATE USE SPI READER SERVICE

See Pages 85 & 86

Floor Spray Gun

F-14 The development of a new spray gun for applying heavy thickness floor coatings has been announced by **Carbo-line Company**, 32 Hanley, St. Louis 17, Mo.

This unique spray gun will apply a smooth, even coat of catalyzed coatings mixed with fillers such as silica and aluminum oxide. The coatings can now be sprayed as thin as 1/16 inch and up to any desired thickness in one coat.

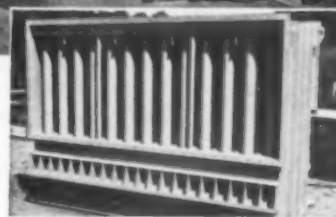
WHIRLEX Shop Assembled DUST COLLECTORS



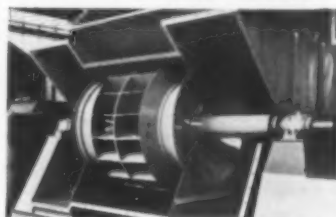
... Cut Erection Costs to a Minimum

This highly efficient Whirlex collector is completely shop assembled and need only be bolted in place at the erection site. Rigid shop inspection assures a "gas-tight" installation thus eliminating the opportunity of error at the job site.

A Whirlex Shop-Assembled Dust Collector may be the answer to your problem. Write for more complete information.



Whirlex Dust Collector completely fabricated and ready for shipment



Whirlex FD and ID fans are designed for heavy, rugged duty

Fly Ash Arrestor CORPORATION

203 North 1st. Street • Birmingham, Ala.

Dust Collectors	•	Induced Draft Fans
Forced Draft Fans	•	Exhaust Fans
Self Supporting Stocks	•	Duct Work



New Product Briefs (Continued)

Single Stage Pumps

F-15

A new line of single stage centrifugal pumps announced by **Goulds Pumps, Inc.**, Seneca Falls, N. Y., provides the optimum in interchangeability of



pumps and parts. Designed especially for the chemical processing, petrochemical and petroleum refining industries, they are equally adaptable for use in any industry that must handle chemicals, corrosive liquids or slurries.

Specific advantages of the modern design of these new units to the pump user include such features as

maximum dimensional interchangeability between all pumps, with one overall length for all sizes — 23"; one coupling fits all sizes — 1½"; one dimension end of suction to center line of discharge — 4". Top center-line discharge is self-venting and simplifies piping. Back-pull-out design enables easy replacement of parts most subject to wear or damage without disturbing pipe connections or motor mounting. The complete line of eleven pumps is stocked in three standard constructions: Ductile Iron, 316 Stainless Steel and Gould-A-Loy 20. It is also available in any machinable alloy to meet special requirements.

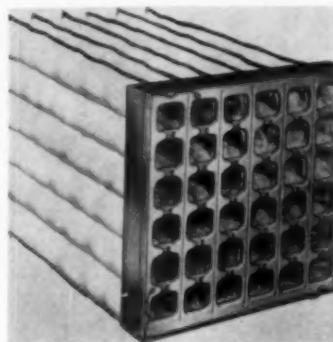
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See Pages 85 & 86

Dry-Type Air Filter

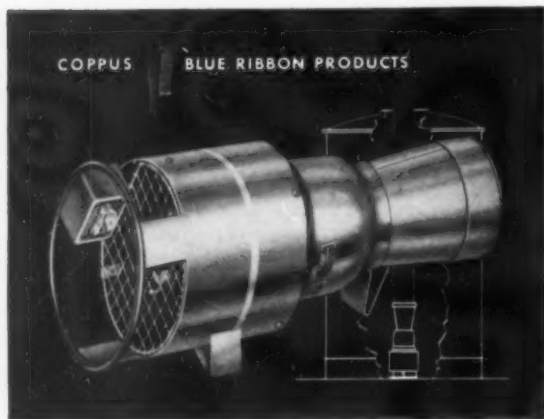
F-16

A new dry-type air filter, the AAF Dri-Pak has been introduced by **American Air Filter Company**, Louisville 8, Ky., answering the demand for a unit filter of high efficiency, low re-



sistance, compactness and unusual dust-holding capacity.

The Dri-Pak filter is revolutionary in that it inflates when the ventilation system is in operation and collapses when the system is shut down. The unit can be inspected and serviced from either the air-entering or



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air-leaving side of the filter bank. Since no back-up wire grid is necessary, chance of damaging the filter during installation has been greatly reduced. The new filter is disposable, extremely light in weight, and requires little storage space.

Insulation Tester

F-17 A recent addition to the product line of **Multi-Amp Electronic Corporation**, 465 Lehigh Ave., Union, N. J., is a portable hand-crank d-c insulation resistance tester.



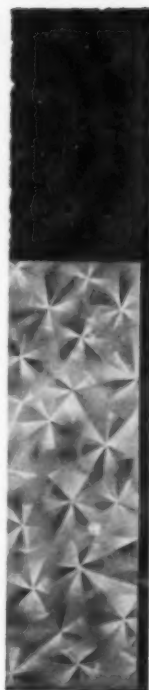
The unit is simple in operation, accurate in reading, and light in weight. Designed for installation and maintenance service in industrial plants and related applications, the Type M miniature tester is suitable for reading insulation resistance of electrical machinery, control, communication equipment, cable, wiring, and electrical parts. Testing is by direct current which is internally converted from alternating current supplied by the manually operated generator.

Floormobile Muffler

F-18 **Handling Devices Company, Inc.**, 34 Concord Lane, Cambridge 38, Mass., announces that gasoline and LP powered Floormobile vacuum cleaning machines are now available with a special automotive-type silencer muffler.

This new muffler eliminates virtually all exhaust noise. Inside, it has a fiberglass insulator, which adds to its noise-muffling efficiency and helps keep the outside cool.

The "Floormobile" provides industry with the means for fast, dust-free and economical suction cleaning of large or small floor areas. It cleans up dust, dirt, shavings, cloth scraps, and other trash at speeds up to 20,000 sq ft an hour.



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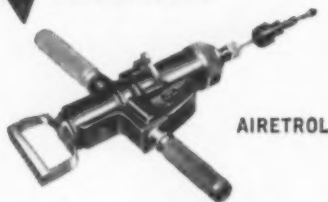


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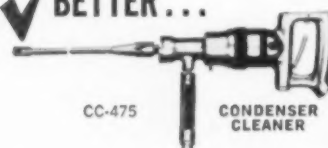
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Typical of the speed with which tube maintenance and fabrication can be accomplished is the performance of the Airetrol automatic expansion control. Easy to operate... one man can roll 12 tubes a minute to .001" accuracy. Fast micrometer setting, convenient roll throttle, quick change chuck and rugged air motor combine to step up tube maintenance with accuracy.

✓ **BETTER...**

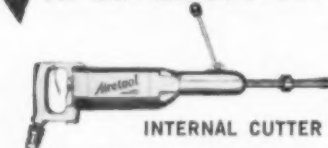


CC-475

CONDENSER CLEANER

Because of Airetool's precision design, accuracy is maintained; downtime held to a minimum. For instance, the CC-475 Condenser Cleaner's air motor operates at 3800 RPM to clean out the toughest deposits while its built-in flushing system washes away chips and keeps bit cool.

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INTERNAL CUTTER

Representative of the low-cost operation of Airetool's complete line of pneumatic tools for maintaining and fabricating tubular equipment for heat exchangers, condensers, etc. Powerful, lightweight air motor speeds work, gets equipment back into service faster.

Airetool also makes a full range of brush heads and other type cleaners for straight or curved tubes and, in addition, a complete line of production tools and grinders. Write for a free demonstration in your plant.



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New Product Briefs (Continued)

Aluminum Unions

F-19 A line of all-aluminum, explosion-proof unions that feature small exterior dimensions has been introduced by Killark Electric Manufacturing Company, 3940 Easton Ave., St. Louis 13,



Mo. Two models are available — the EUF series with female ends, and the EUM series with a male end and a female end.

The body and the ring of these unions are tapered to provide a positive seal if an interior explosion occurs. UL and CSA approvals have been obtained. The new unions are designed with the smallest diameter and shortest length possible. Reducing the overall size allows parallel conduit to be placed closer together, as well as more flush with walls.

Dust-Free Materials

F-20 The Johnson-March Corporation, Philadelphia, Pa., has developed a new bulk-material conditioner that permits dust-free handling of powdery, finely-divided materials. The material conditioner, called Verticone, makes bagging operations, loading and unloading from bins, silos, ships, trucks or rail cars and especially dust collector bins dust-free.

The Verticone suppresses dust by adding a precisely controlled amount of moisture into the finely-divided material. The key to effective conditioning is controlled wetting of all the surfaces of each particle with an extremely powerful surface active compound, called Compound MR. Controlled wetting by the Verticone adds as little as 1% of moisture. Wetting may be adjusted to apply any desired amount of moisture.

Packaged Boiler

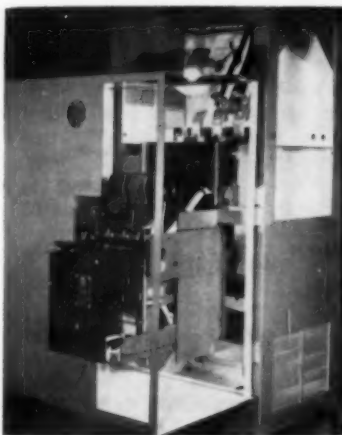
F-21 The new Scottie Junior series of Kewanee Scotch type forced-draft packaged boilers for high and low pressure operation and featuring forced draft firing with light oil, gas or combination gas-oil is now available from American-Standard Industrial Division, Detroit 32, Mich.

Supplementing the existing line of Kewanee commercial packages, the new Scottie Junior units have output ratings of 20 to 150 hp for high pressure and 672,000 to 5,040,000 Btuh for low pressure. Ratings are conservatively based on five square feet of heating surface per horsepower for adequate reserve capacity.

For More Free Data FILL IN CODE NO. on the Handy Return Card — Page 85

New Breaker Enclosures

F-22 Individual enclosures for its new line of K-Don circuit breakers — low-voltage current-limiting units affording fault protection against currents as high as 200,000 amperes — have been



developed by I-T-E Circuit Breaker Company, 1900 Hamilton St., Philadelphia 30, Pa.

The K-Don breakers are now available in the new enclosures for many applications in industrial plants, commercial buildings and institutions where single, wall-mounted breakers are used. Combining the features and advantages of the I-T-E Urelite enclosures with those of the K-Don breakers provides a most effective protection package.

Cable Phasing Test Set

F-23 This new test set offered by **James G. Biddle Co.**, 1316 Arch St., Philadelphia 7, Pa., provides a reliable means for phase or conductor identification



on underground cable systems. It effects important savings in labor costs without lowering safety practices. The principles employed in this new development permit its reliable use without removing all safety grounds.

The transmitter consists of a packaged steep-wave-front impulse circuit connected to the cable terminal which periodically sends a pulse out on one identified conductor and back on another. The transmitter is a dual source device which can be operated from either a 60 cycle supply or from self contained dry cells.

The detector, for use in identifying individual conductors in the cable, is a unit similar to a clamp-on ammeter. When clamped around the A phase conductor, the detector gives a pointer deflection in one direction, in the opposite direction for B phase, and no deflection for C phase. Actually in making tests in the man-hole, all three conductors of the cable under test are connected to ground after they have been exposed, and the detector is clamped around each ground connection consecutively.

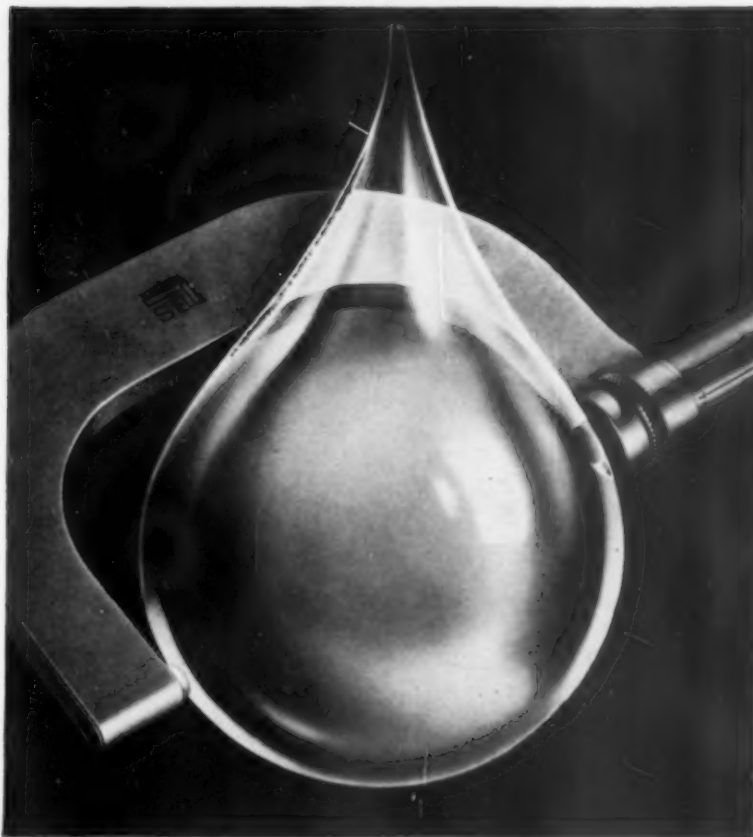
Asbestos Sheet Packing

F-24 An improved Style 340 sheet packing material of compressed asbestos and synthetic rubber, has been announced by **Keasbey & Mattison Co.**, Ambler, Pa., manufacturers of asbestos insulations, asbestos-cement building materials, and sheet packings.

Tests and field experience qualify the sheet as a multipurpose packing material of the type that was formerly available only in premium grade packings. But the improved K&M Style 340 sheet is available as a standard item.

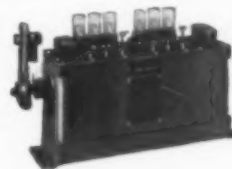
(Continued on page 91)

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MAINTENANCE—TOOLS EQUIPMENT & METHODS

18—Maintenance Ideas—4 page folder highlights 90 ways Kano Kroil and other products can help the man-in-the-plant. — KANO LABORATORIES.

35—Stop Corrosion—4 page bulletin tells how Alkasteem neutralizes carbon dioxide and Ox-Gem reacts with oxygen to stop corrosion in boilers, heaters, condensate returns, steam lines and traps. — ANDERSON CHEMICAL COMPANY, INC.

37—Maintenance Gun—Brochure describes the Von Arx Air Gun — lightweight tool for tough cleaning, de-scaling and de-rusting jobs. Air operated reciprocating needles adjust to contours automatically. Three sizes. Comes in handy kit with accessories. — MARINDUS COMPANY.

50—Industrial Weed Problems? — Any man can weed-proof 10,000 sq ft in ten minutes with Ureabor — the dry granular weed-killer. You only use 1 to 2 lb per 100 sq ft. Folders give details on long-lasting control and your nearest distributor. — UNITED STATES BORAX & CHEMICAL CORP.

51—Chimney Protection—New non-asphaltic, spray applied coating for use in concrete, steel, and brick chimneys inhibits corrosion from acid exhaust gases. Customer field tests rate STACKFAS outstanding on heat, acid and fly ash abrasion resistance. — BENJAMIN FOSTER COMPANY.

54—Repair & Maintenance Products — Complete product line shown in use with prices, sizes, weights, colors and styles. All products distributed by Rasco's 11 Southeastern Branches. — REYNOLDS ALUMINUM SUPPLY CO.

55—Better Tube Maintenance—Catalogs describe how line of air-powered tools and accessories (condenser cleaners, tube cutters, expanding brush head cleaners, etc.) are job-fitted to specific tube repair operations. — AIRETOOL MANUFACTURING COMPANY.

57—Maintenance Painting — The Porter Manual makes it easy to do the right thing with your paint maintenance dollar. Details Planning, Surface Preparation, Application, Film Thickness, Classification of Surfaces, Abrasion Resistant and Heat Resistant Finishes and Fungus Control. — PORTER PAINT CO.

58—Tube Expander Drives — Bulletin 581 gives data on complete line of Torq-Air-Matic automatic tube expander drives and explains the importance of precision control in tube expanding. Chart to aid selecting right model for the right job. — THOMAS C. WILSON, INC.

84—Zinc Coatings — Bulletin No. 4 describes Galvanox-Type II (Epoxy) a zinc-rich coating to be used as repair item for damaged areas on galvanized sheets and structures. Provides both cathodic type and barrier protection. — SUB-OX INC.

FANS—PUMPS—COMPRESSORS HEATERS—HEAT EXCHANGERS

105—Heat Exchanger—Heat recovery is dollar recovery. By capturing ordinarily wasted heat and putting it to useful work, modern heat exchangers have proven a great source of plant economy. New 12-page bulletin describes the Fin-Pak, an efficient lightweight heat exchanger for gas turbine and diesel and gas engine cycles, chemical and food processing, steam air heating, etc. — AIR PREHEATER CORPORATION.

107—Proportioning Pumps — 4 page brochure illustrates and describes proportioning pumps and package chemical feeding units. Includes applications and specifications. — THE BIRD-ARCHER CO.

154—Chemical Feeders — Bulletin 202, 4 pages, illustrates and describes the Ful-O-Feeder chemical system for continuous heavy duty service. — FULBRIGHT LABORATORIES, INC.

165—Heat Exchangers—Bulletin 120 illustrates function of new equipment to provide cooling of liquids in industrial plants. Air-cooled heat exchanger, which is independent of large supply of cooling water, provides additional savings of installation and operation expense — NIAGARA BLOWER COMPANY.

170—Pumping Problems? — Two stage, Type JC pump will meet requirements up to 650 gpm. Horizontally split casing top can be taken off quickly for inspection and rotating parts removed and replaced without disturbing piping, connections, fittings or driver. — THE WEINMAN PUMP MFG. CO.

172—Pressure Fans — For 10" to 50" SP and capacities 200 to 13,000 cfm. Dimensions and capacity tables

included in 20 page Catalog 857. — CLARAGE FAN CO.

190—Centrifugal Pumps—Bulletin 1 — Gives a condensed listing of all types of centrifugal pumps for every service, including capacity, pressure and head range for each type. A quick reference on centrifugal pumps from A to Z. — PACIFIC PUMPS, INC.

INSTRUMENTS—METERS CONTROLS—REGULATORS

211—Butterfly Valves — Folder supplement to Catalog 307 stresses flexibility in valve line for controlling large volumes of liquids or gases. Valve actuators, special arrangements, shaft extensions, and electric actuators and positioners are featured. — MASON-NEILAN.

223—Combustion Control — Bulletin 1023, 24 pages—Contains installation photos and diagrams of Bailey air operated combustion control for oil and gas fired boilers; two pages of chart records and six page list of typical installations. — BAILEY METER COMPANY.

224—Feedwater Regulator—Bulletin 1044 describes the BI Feedwater Regulator, the single-element unit employing a thermostatic-tube level controller which actuates a regulating valve in feed line. For loads from 10 to 785 psig. Includes specifications table and schematic diagram. — COPES-VULCAN DIV.

225—Cooling Controls—Self-powered controls for compressors, stills, solvent coolers, degreasers and small engines are described in Bulletin 710; operational and hook-up sketches. — SARCO COMPANY INC.

228—Fuel Cut-Outs & Water Level Alarms — Brochure D2 — Electrode type equipment for installation on water columns to provide fuel cut-out, high and low water level alarms and pump cut on and off. For pressures to 2500 psi. — RELIANCE GAUGE COLUMN CO.

235—Liquid Level Gauges—Bulletin 463A describes automatic remote reading systems for nearly any liquid. Features include easy to read dial indication. — LIQUIDOMETER CORP.

252—Water Columns, Gauges, Equipment — Brochure AO — Introduction to low pressure (0 to 250 psi) division of catalog data. Explains principles and construction of Re-

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liance low pressure alarm water columns, and lists accessory equipment. — **RELIANCE GAUGE COLUMN CO.**

287—Color-Port Water Gage — Bulletin WG-1814 describes the new gage for high pressure boilers (up to 3300 psi). Gives full details on design and operation and shows how it gives greater visibility and greatly reduced maintenance requirements. — **YARNALL-WARING COMPANY.**

PLANT CONSTRUCTION—WELDING EQUIPMENT—SPECIALTIES

300—Buyer's Guide — Up-to-date industrial and maintenance building products stock list. Includes complete listing of all Rasco distributed products plus branch locations. — **REYNOLDS ALUMINUM SUPPLY CO.**

304—Backing Rings — Bulletin 56-2 describes rings for fast economical fit-up in piping, tubing, fittings and valves. Shows how rings assure uniform complete-penetration welds and ease of handling in shop and field. Carbon steel, wrought iron, chrome alloys, stainless, aluminum and copper. — **ROBVON BACKING RING CO.**

316—Drainage & Construction — Catalog Gen-10658 gives data on products for industrial uses, including corrugated metal pipe, paved-invert pipe, Asbestos-Bonded pipe, Multi-Plate pipe, pipe arches, perforated pipe, and water control gates. — **ARMCO DRAINAGE & METAL PRODUCTS, INC.**

317—Drier Compressed Air — Bulletin 130 shows how Aero After Cooler cools compressed air or gas below temperature of surrounding atmosphere; no further condensation in air lines. Installed outdoors. Saves cooling water. Gives better operation of air-operated tools. — **NIAGARA BLOWER COMPANY.**

324—Painting New Plants — "Plan Painting of New Plants to Reduce Costs" describes how lead-suboxide paints can save 1 or 2 coats of paint on new plants. Eventual repainting costs are cut as well since these paints form a dense, metallic lead film which can be recoated without expensive scraping, sanding or repriming. — **SUBOX INC.**

342—Power Roof Ventilators — Bulletin 550 describes V-belt driven centrifugal type power roof ventilators. Pressures to 2" SP; capacities from 1500 to 26,500 cfm. — **CLARAGE FAN CO.**

347—Chemical Feeders — 34 page Catalog 1136 helps you select the exact metering pumps needed to meet any requirements. — **MANZEL.**

386—Rigid Frame Buildings — 8 page bulletin "Dixisteel Rigid Frame Buildings" — low cost, flexibility of design, durability, and minimum maintenance; also triangular or bow-string truss all-steel roof systems; fabricated for rapid erection. — **ATLANTIC STEEL COMPANY.**

PIPING—VALVES—FITTINGS STEAM SPECIALTIES—TRAPS

401—Steam Traps — Bulletin 775 gives price, dimension and capacity data on Open Float and Thermostatic Steam Traps for trouble-free heating service. — **ARMSTRONG MACHINE WORKS.**

403—Valve Operators — Folder shows how re-designed sprocket rim makes any valve readily accessible from the floor. Simplifies pipe layouts, prevents accidents, fits all valve wheels. — **BABBITT STEAM SPECIALTY CO.**

406—Blow-Off Valves — Unit-tandem valves for boiler pressures up to 665 psi described in Bulletin B-435. Tells how to specify and how to order. — **YARNALL-WARING COMPANY.**

408—Wide-Range Valves — Data Sheet 10-5 covers the "Point 4 Factor Trim" — answer to those few types of applications where reduced capacity trim is desirable. Available in V-port and solid turned designs for double or single seated valves and in wide variety of material. — **MASON-NEILAN DIV.**

409—Lubricated Plug Valves — Catalog PV-4 covers operational features. Quarter-turn to open or close; lubricant grooves provide positive seal when valve is closed; when open, seating surfaces not exposed. — **THE WM. POWELL COMPANY.**

411—Steam Trap Book — 48 page manual reviews importance of good trapping. Gives complete data on traps and strainers. Contains complete selection, installation, testing and maintenance information. Many useful tables and charts. — **ARMSTRONG MACHINE WORKS.**

435—Liquid Level Controls — Cat. 405 gives full details and specifications of wide-range types of controls for a wide variety of applications. Employ torque tube packless design. Six types of mounting connections. — **MASON-NEILAN DIV.**

443—PVC Fittings & Flanges — Corrosion resistant polyvinyl chloride pipe fittings and flanges covered in 12 page catalog, featuring characteristics, advantages, limitations, operating pressures, temperatures and field tests. — **GRINNELL COMPANY, INC.**

452—Pipe and Tubes — 42 page Bulletin 26 gives types of steel tubes, tensile, creep and rupture properties, welding and forming data, applications and other valuable information. — **National Tube Div., UNITED STATES STEEL CORP.**

458—Stainless Valves — Catalog gives complete technical data on stainless steel valves for all purposes. Over 100 valves diagrammed and described. — **REYNOLDS ALUMINUM SUPPLY CO. — COOPER ALLOY CORP.**

478—Trap Selection — Booklet "How to Select Steam Traps and Other Fluid Specialties" gives valuable

tips on which of the four basic types of traps — inverted bucket, thermostatic, combination or float — to use for any installation. — **V. D. ANDERSON CO.**

487—Power & Process Piping — Offering single responsibility, specialized service, integrated facilities for all piping, Catalog 60B highlights erection, fabrication and welding fittings details. Case studies from the South-Southwest. — **MIDWEST PIPING COMPANY.**

493—Unions & Swing Check Valves — Engineering data, sizes, weights and dimensions on Perfect Seal Pipe Unions and Swing Check Valves featured in 20-p Cat. 60. Also includes Gasketless Cup-Orifice Unions and Ductile Iron Check Valves. — **CATAWISSA VALVE & FITTINGS CO.**

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BOILERS—STOKERS BURNERS—FUELS

502—Feedwater Treatment — 4 page catalog tells how Braxon and Flako internally condition water to remove and prevent scale formation and corrosion in boilers. — **ANDERSON CHEMICAL COMPANY.**

507—Packaged Water Tube Boilers — Descriptive catalogs detail 10 outstanding features including six-wall furnace cooling, insulated double-steel casing, manway in every drumhead, and tangent tubing providing "solid walls of water" on four sides of furnace. — **SPRINGFIELD BOILER COMPANY.**

515—Packaged Steam Generators — Bulletin PSG-3 describes factory assembled portable type units from 10,000 lb/hr to 48,000 lb/hr capacities. Gives construction details and dimensions. In standard pressures of 175, 250 and 375 psi. — **HENRY VOGT MACHINE CO.**

521—Gas Tempering — How you can burn the most economical fuel available (coal, oil or gas) described in Bul. G-96. Cuts overall plant costs since smaller size unit requires smaller building per kw. — **THE BABCOCK & WILCOX CO.**

539—Industrial Burners — How to keep heating costs low with Hev-E-Oil commercial industrial burners described in bulletin SPI-859. Models from 5 to 150 gph; automatic, electronic controls; Hev-E-Duty power gas burners and combination gas/oil burners from 720,000 to 21,000,000 Btu. — **INDUSTRIAL COMBUSTION, INC.**

Bulletins (Cont.)

542—Underfeed Stoker — Illustrated Cat. 401 gives complete data on double retort underfeed stoker built for heavy duty service in intermediate size range for boilers of 20,000 lb to 34,000 lb of steam/hr capacity. —DETROIT STOKER CO.

545—No. 6 Oil Burner — Low pressure air atomizing burner, described in Bulletin AD-158, is rated at 90 gph. Components include latest type of combustion controls. —CLEAVER-BROOKS COMPANY.

547—Gas and/or Oil Burners — Bulletin B1 describes large or small, single or dual fuel, packaged or field assembled, atmospheric or forced draft burners; electronic of all types; competent sales and service. —WEBSTER ENGINEERING CO.

551—Packaged Water Tube Boilers — Complete data and dimensions for boilers ranging from 8,000 to 50,000 lb/hr, firing oil or gas or both, described in 12 page Catalog 111-D. —SUPERIOR COMBUSTION INDUSTRIES, INC.

555—Package Air Preheater — 14 page booklet tells how you can install this package unit at fraction of expense required for conventional heat recovery equipment. Fast and easy installation offering long term fuel savings. —THE AIR PREHEATER CORP.

565—Self-Contained Boilers — 8 page brochure AD-162 describes line of Model CB boilers. Highlights design features, fuel flexibility, four-pass, forced draft design, unified electric and steam preheater, quiet vibrationless impeller, and hinged doors with built-in refractory. —CLEAVER-BROOKS CO.

567—Boiler Equipment — New data on steam generators in sizes to 500,000 lb/hr, for high or low steam pressures and temperatures, for all types of fuel and firing methods. —WICKES BOILER CO.

570—Seamless Boiler Tubes — 44 page Bulletin 12 contains complete description of manufacture, advantages, tolerances, allowable stress and working pressures, bursting strength, weights, steam properties and other data. —NATIONAL TUBE DIV., UNITED STATES STEEL CORP.

574—Packaged Generator — Bulletin 582 describes Vapomatic Coil-N-Shell Steam Generator for service requirements of 5 to 150 psig. Gives operation features and specifications. Available with gas, oil, and combination gas/oil fuel systems. —TEX-STEAM CORP.

594—Packaged Boiler — Ten outstanding features of new positive flow model in 5 sizes (50-100 hp) include ease of operation and accessibility. Bulletin 1275 gives engineering details. Oil-gas and combination fired. New burner design. —ORR & SEMBOWER, INC.

POWER TRANSMISSION MATERIAL HANDLING

606—Retaining Ring Kits — 400 Tru-arc cadmium plated rings — 84 sizes in one economy kit. Sizes from ¼ to 2½ in. in three most used series of internal, external and universal crescent ring designs — \$34.50 per kit. —DIXIE BEARINGS, INC.

608—Side-Loading Trucks — One unit can easily load, stack and transport long, bulky selective loads. Traveler loader maneuvers in aisles only 6½ ft wide; electric and gas powered units; low maintenance features. —BAKER INDUSTRIAL TRUCKS.

625—Job-Mated Hoists — Capacities from ¼ to 30 tons; motor-driven or push-type trolleys; single or multiple speed controls pushbutton, pendant rope, or lever controllers; floor or cab operation; vapor-proof or explosion-proof construction. —SHEPARD NILES CRANE AND HOIST CORP.

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See Pages 85 & 86

627—Variable Speed Fluid Drives for blowers, fans, pumps, compressors, etc., detailed in 20 page Bulletin A-719. Features of the Gyrol fluid drive include no load starting, power savings, simpler and better control. —AMERICAN-STANDARD INDUSTRIAL DIVISION.

635—Bearings & Bars — Pocket size edition 158 gives complete list of cast bronze and sintered bronze bearings and bars. Bearing aluminum bar data included. —THE BUNTING BRASS AND BRONZE COMPANY.

641—Belt Conveyors — Cat. ID-591, 88 pages, shows principal belt conveyor products, including heavy duty standard roller bearing and precision ball bearing idlers. Engineering data section contains simplified information for proper selection. —CONTINENTAL CONVEYOR & EQUIPMENT CO.

644—Elevator Maintenance — How Otis contract maintenance service keeps equipment operating like new outlined in 24-page catalog. Preventive maintenance corrects one fault before one fault can cause another. —OTIS ELEVATOR COMPANY.

653—Pulverizers — Planetary role and table units for coal, limestone, gypsum, solid chemicals, food products and other materials described in Bulletin MB-58-1. Capacities from 2 to 55 tons of pulverized material per hour. —FOSTER WHEELER CORPORATION.

WATER TREATMENT—HEATING & AIR CONDITIONING—DUST & FUME CONTROL—REFRIGERATION

700—Peak Load Problems? — Keep your air conditioning and refrigeration systems operating at maximum efficiency during peak load months. Catalog tells how Anco treatment removes rust and scale and kills slime and algae in equipment. —ANDERSON CHEMICAL COMPANY.

701—Exhausting Corrosive Fumes — Bulletin 702-A shows how corrosive fumes can be exhausted with rubber, lead lined or specially coated fans. —CLARAGE FAN CO.

704—Water Conditioning — Brochure describes company's engineering services — zeolite water softeners, filters and purifiers, aerators and degasitors and process and boiler water conditioning, rebuilding and modernizing service. —SOUTHERN WATER CONDITIONING, INC.

705—Test Your Tower — Bulletin offers simple, proven method of determining how closely actual tower performance measures up to specified performance. Particularly applicable to operations geared to temperature of process cooling water. —THE MARLEY COMPANY, INC.

709—Purer Process Water — Data tells how Ferri-Floc (ferric sulfate) can help with coagulation and softening, removal of iron and manganese and other water purification problems. —TENNESSEE CORPORATION.

711—Refrigeration Condensers — Bulletin RC-2 shows how Vogt condensers step up rate of heat transfer and step down head pressures. Closed type for clean water; film type where water is hard and forms scale. Units save power and refrigeration cost. —HENRY VOGT MACHINE COMPANY.

713—Electric Precipitators — 26 page Bulletin 104 shows how units meet five engineering requirements — positive control of gas flow; high uniform electrode emission; effective continuous cycle rapping; and safe trouble-free high voltage equipment. Gives 9 steps to successful installation. —BUELL ENGINEERING COMPANY, INC.

724—Chemicals & Services — Water treatment chemicals and engineering services for The Industrial South-Southwest highlighted in 12-page Bulletin 5000-A. Specific products and their functions detailed. —DEARBORN CHEMICAL COMPANY.

730—Hydrazine — Bulletin BW 8, 10 pages — Discusses chemical reduction of oxygen in boiler feed-water with Deoxy-Sol, a 35% aqueous solution of hydrazine. Gives flow diagram; covers handling and storage; includes bibliography. —FAIRMOUNT CHEMICAL CO., INC.

742—Water Treating Equipment Guide — Bulletin 615 illustrates and describes the newest in

manual and automatic zeolite water softeners, demineralizers and deionizers, dealkalizers, etc. Spray and tray type deaerating heaters and water treating chemicals also included.—ELGIN SOFTENER CORP.

743—Compressor & Engine Filters — Bulletin 310-6, 4 pages, contains information on air filters for compressors and engines, designed to eliminate costs and delays of forced shut-downs caused by dust concentration. — COPPUS ENGINEERING CORP.

752—Automatic Water Control — 4 page bulletin describes Chemtrol control for treatment of cooling tower water. Adaptable to any size unit, in any location, and to any type water, it controls pH, prevents scale, controls corrosion and eliminates algae — all simultaneously, completely automatically and economically.—WATER SERVICES INC.

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758—Cooling Towers—Induced draft counter-flow units with water-mixer drift eliminators, full cone spray nozzles, rigid double diamond fill racks and double lapped sheathing panels described in Bulletin CT-57-1. FOSTER WHEELER CORP.

771—Water Treatment — 4 page brochure describes company's 8-point water treatment coverage for elimination of scale, sludge, corrosion and impure steam. — IPCO LABORATORIES, INC.

ELECTRICAL

802—Low-Peak Fuses — New fuses that safely interrupt fault currents up to 200,000 amp described in Bulletin LPS. Protect mains, feeders, branch circuits, switches. Limit fault current to very low values. Hold 500% load for minimum of ten seconds. Available in N.E.C. sizes from 15 to 600 amp in both 250 and 300 volt ranges. — BUSSMANN MFG. DIV.

803—Power Control — Bulletin describes design, manufacturing and consulting services for motor control centers; switchgear; power centers; specialty, mechanical and automation control requirements. — POWER CONTROL COMPANY.

804—Conductor Identification—New phase identification set (Bulletin 82SP) saves labor costs on phase determination and conductor identification on underground systems without need for removing all safety grounds. Transmitter operates from either 60 cycle supply or self-contained dry cells. — JAMES G. BIDDLE CO.

813—600-Volt Wiring—How Anaconda Densheath 900 offers long life, high heat and moisture resistance, chemical stability and easy installation is described in Bulletin DM-5612 — ANACONDA WIRE & CABLE CO.

816—High Voltage Protection — 36 page catalog of linemen's protective equipment describes products for utility and industrial electrical fields. — CHARLESTON RUBBER COMPANY.

820—Electrical Maintenance — New contract service (for Southeast only) inspects and tests motors, generators, gearing, control and distribution systems, at a cost less than 1% of value of equipment. — Atlanta Office of WESTINGHOUSE ELECTRIC.

822—Hi-Temp Industrial Wire—Densheath 900's multiple ratings for 6 applications outlined in Catalog DM6030. Exceptionally stable against heat, chemicals, oils, and moisture. 100% water tested at factory. Use it as industrial, machine tool, appliance, control, or building wire. — ANACONDA WIRE & CABLE CO.

885—Electrical Maintenance — File 21 tells how to set up good electrical testing program — insulation resistance testing, motor and phase testing, cable fault location. — JAMES G. BIDDLE CO.

Late Bulletins

R-1—Protective Clothing—Code No. 112-113, 2 pages each, describe Plastsmith Inc.'s Handgard work gloves and Footgard boots, both made of disposable polyethylene for protection of personnel and products. — FARRIS CHEMICAL EQUIPMENT & SUPPLY CO., 203 N. Weisgarber Road, Knoxville 19, Tenn.

R-2—Multi-Stage Turbines—Bulletin GEA-7152 describes a complete line of single-valve, multi-stage mechanical drive turbines for various applications and flow requirements. — GENERAL ELECTRIC COMPANY, Schenectady 5, N. Y.

R-3—Dial Thermometers — Catalog 155, 20 pages, presents bi-metal actuated dial thermometers for industrial use. Shows construction features, sizes, stem lengths, dimensions, weights, and general specifications. — MANNING, MAXWELL & MOORE INC., Stratford, Conn.

R-4—Alarm System — Bulletin AT-261, 2 pages, gives catalog data on alarm telemetering system Model AT-100, which provides continuous monitoring of up to 50 alarm signals. — INSTRUMENTS, INC., P. O. Box 556, Tulsa, Okla.

R-5—V-Belt Clutch—Ball-Lok Catalog 40, 8 pages, tells how to select the proper clutch to do the job.

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Bulletins (Cont.)

Describes general purpose, heavy-duty, ball-bearing and special duty clutches.—V-BELT CLUTCH COMPANY, 418 North Western Ave., Los Angeles 4, Calif.

R-6—Reactor-Clarifier—Bulletin SM-1006, 24 pages, presents the many types and applications of modern Reactor-Clarifier treatment units for water and wastes, with series of wash drawings showing flow patterns.—THE EIMCO CORPORATION, P. O. Box 300, Salt Lake City 10, Utah.

R-7—Low Pressure Boilers—Bulletin No. 640B describes Kewanee Type C-7L series boilers for low pressure heating of industrial plants. Tabulates ratings and dimensions of 16 sizes.—AMERICAN-STANDARD INDUSTRIAL DIVISION, Detroit 32, Mich.

R-8—Insulation Testers—Bulletin 21-45-25, 12 pages, covers "Megger" insulation testers in the 500 and 1000 volt class with new extended sensitivities up to 10,000 megohms in the 1000-volt instruments.—JAMES G. BIDDLE CO., 1316 Arch St., Philadelphia 7, Pa.

R-9—A-c Motors—Bulletin B-2515, 16 pages, outlines features of new Duty Master a-c motors from 1 hp to 2000 hp, with selection data

for various applications.—RELIANCE ELECTRIC & ENGINEERING CO., 24701 Euclid Ave., Cleveland 17, Ohio.

R-10—Positive Flow Boiler—Bulletin No. 1275 introduces the new Powermaster boiler featuring positive circulation design, hinged front and rear covers, and hinged dry back and optional wet back construction.—ORR & SEMBOWER, INC., Reading, Pa.

R-11—High Pressure Pumps—Bulletin No. 722.4, 8 pages, gives information on multi-stage centrifugal pumps in capacities up to 2600 gpm for heads up to 3400 ft, and maximum working pressure 1200 psi.—GOULDS PUMPS, INC., 223 Black Brook Rd., Seneca Falls, N. Y.

vided by water analysis and provision of briquettes of correct chemical content.—Distributed by IPCO LABORATORIES, INC., 2710 Apple Valley Road, Atlanta 19, Ga.

R-17—Sulfamic Acid Cleaning—Bulletin A-15181, 8 pages, gives newly developed scale dissolution rates for sulfamic acid cleaners. Diagram sheet, 4 pages, shows simple equipment cleaning hookups for heat exchangers and similar equipment.—E. I. DU PONT DE NEMOURS & COMPANY, Wilmington 98, Del.

R-18—Foamed Solvent—Pamphlet, 4 pages, entitled "Foam," discusses new technique of cleaning industrial equipment with lightweight foamed solvent for efficiency and economy.—DOW INDUSTRIAL SERVICE, 20575 Center Ridge Rd., Cleveland 16, Ohio.

R-19—Pipeviewing Camera—Catalog Sheet PD-700, 2 pages, introduces a new closed-circuit television camera designed to explore pipes as small as 4" dia.—GENERAL PRECISION, INC., GPL Div., 63 Bedford Rd., Pleasantville, N. Y.

R-20—Steam Traps—Lecture No. 1A, 20 pages, shows reproduction of film strip with explanatory text on types, operation, and maintenance of steam trapping and air venting.—SARCO COMPANY, INC., 635 Madison Ave., New York 22, N. Y.

R-21—Alkaline Detergent—Service Bulletin No. 17B, 2 pages, describes Oakite RR Cleaner for removal of burned-on oil and other heavy-duty cleaning by steam or hot tank.—OAKITE PRODUCTS, INC., 123A Rector St., New York 6, N. Y.

R-22—Grinders & Buffers—Catalog 72, 30 pages, covers electric grinders, buffers, dust collectors and accessories, with illustrations and specifications.—THE HISEY-WOLF MACHINE CO., Galvin & Mt. Hope Ave., Cincinnati 4, Ohio.

R-23—Steam & Water Service—Engineer's Manual, 48 pages, discusses installation and maintenance of steam-water control systems, and includes schematic diagrams.—THE POWERS REGULATOR COMPANY, 3442 Oakton St., Skokie, Ill.

R-24—Tank Lining—Bulletin, 4 pages, explains how "Kolmetal" metallic lining and coating prevents contamination in tanks carrying edible products, oil, salt water and chemicals.—EMJAY MAINTENANCE CORP., Kolmetal Div., Carlstadt, N. J.

R-25—Chain Drives—Bulletin 59126, 24 pages, is a handbook on the installation, operation, and maintenance of chain drives. Illustrated with line drawings.—CHAIN BELT COMPANY, Milwaukee 1, Wis.

R-26—Slime Control—Technical Bulletin, 2 pages, presents problem of algae and slime in cooling water systems, and solution through use of biocides.—WESTERN CHEMICAL COMPANY, 713 Washington St., Kansas City 5, Mo.

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R-12—Soot Blower—Bulletin 1063, 8 pages, describes the Vulcan T-30 Mark I-E long retractable soot blower with electric drive. Diagrams explain cleaning accomplished by double-helix paths.—BLAW-KNOX COMPANY, COPES-VULCAN DIVISION, Erie 4, Pa.

R-13—High Voltage Insulation—Bulletin 1131, 48 pages, "Okonex Insulated Cables," describes butyl-base rubber insulation for multipurpose service up to 90 C and resistant to ozone, heat and moisture.—THE OKONITE COMPANY, Passaic, N. J.

R-14—Ball Valves—Catalog No. 1200 gives comprehensive information on manually and pneumatically operated ball valves in sizes from 1/4" through 12", with two basic types catalogued in detail.—HILLS-McCANN COMPANY, 400 Maple Ave., Carpentersville, Ill.

R-15—Adjustable Speed Drives—Application Data 5560, 8 pages, discusses RectiFlow and MagnaFlow adjustable speed drives for pumping applications, with an informative drive selector guide for many industries.—WESTINGHOUSE ELECTRIC CORPORATION, P. O. Box 2099, Pittsburgh 30, Pa.

R-16—Cooling Water Treatment—Designed especially for automatic control of scale, corrosion and slime in cooling towers and evaporative condensers, "Chemicator" is manufactured by the Chemical Div. of Erlen Products Co. Chemical feed is provided by an ingenious arrangement of briquettes in a container through which water is circulated. Exact formulation required is pro-



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New Products (Contd.)

Tile-Cote Wall Colors

F-25 Four new wall finish colors — ivory, beige, pale green, and haze grey — have recently been added to the line of the **Wilbur & Williams Co., Inc.**, 650 Pleasant St., Norwood, Mass.

"Tile-Cote," an activated epoxy coating, is extremely easy to apply with either brush or spray and features a minimum 8 hour pot-life (up to 36 hours in many cases). It contains a minimum of 50% epoxy resin in each color.

Motor Combined With Variable Speed Drive

F-26 Exceptional compactness has resulted by incorporating a motor with a mechanical variable speed drive, manufactured by the **Cleveland Worm & Gear Division**, 3300 E. 80th St., Cleveland 4, Ohio. Utilizing an integral "pancake" style motor, the new Motorized Speed Variator requires only slightly more space than



an equally rated conventional motor. The new line is available in sizes from 1/3 to 15 hp. It provides variable output speeds with 9:1 and 6:1 ranges. Since it employs the rolling action of a series of balls, it permits smooth adjustment of the output speed while operating under load.

Power is transmitted through input shaft to a beveled drive disc in contact with axle-mounted alloy steel drive balls. Input shaft rotation causes balls to rotate about their axles, which in turn transmits power to the output shaft by a similar ball-disc contact. Output speed is determined by relative lengths of the contact paths on input and output sides

of the balls. By tilting both axles and balls, relative lengths of the two contact paths are varied to change ratios.

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See Pages 85 & 86

Heat Exchanger

F-27 A new C-500 heat exchanger series, featuring removable bundles with floating head clamp-ring design, is now available from **American-Standard Industrial Division**, Detroit 32, Michigan. This design is highly advantageous for applications where frequent cleaning of the tubes is necessary and/or where thermal differential expansion between the shell and tubes becomes a problem.

The new exchangers will handle any combination of liquids and gases, including those which are toxic, volatile or flammable. They may be used as heaters, coolers, condensers or vaporizers. They are available in 19 shell sizes from 6" through 42" and with any practical tube length in two, four or six tube pass arrangements. Shell-side and tubeside design pressures range from 75 to 300 psi.

Masonry Leaks Stopped

F-28 The **Stonhard Company Inc.**, 401 N. Broad St., Philadelphia 8, Pa., is offering a new liquid chemical formula called "Stontite." The product has proven effective in stopping water leaks and seepage from masonry lined pools, tanks, and similar installations.

When "Stontite" is mixed with Portland cement, it produces a dense, quick-setting mortar which adheres with a tight bond to any type of masonry material. It dries rapidly and can be applied even against hydrostatic pressure. It has been successfully used in water-tight plug repairs to dams. When used as a plaster coating, it is applied to the exposed side of walls where it quickly dries and prevents moisture seepage.

Diaphragm Valves

F-29 A complete new line of air-powered diaphragm operators for remote actuation of its diaphragm valves is announced by **Hills-McCanna Company**, 4600 West Touhy Ave., Chicago 46, Ill. Three types of operators are offered: air-open air-close; air-open spring-close; and air-close spring-open. Each is built in four sizes for 1/4" and 3/4", 1" and 1 1/4", 1 1/2" and 2" valves. (Other types of operators are available for valve sizes through 14".)

The spring-loaded operators return the valves to full-open or full-closed position in event of air system failure. Where this is not necessary, the air-open air-close model offers the advantage of smaller size and minimum air pressure requirement.

Teflon Lined Tubing

F-30 The outstanding physical and chemical properties and advantages of Teflon tubing and the thermal protection, scuff, weather and oil resistance of Neoprene are combined in Teflon lined rubber tubing now being offered by **Pennsylvania Fluorocarbon Company, Inc.**, 1115 N. 38th Street, Philadelphia 4, Pa.

The tubing can be used in a wide variety of applications where protection to the Teflon is required to prevent kinking or collapsing in service. The Teflon liner is available in 1/4" through 1" I.D. sizes covered with 1/8" Neoprene rubber, or other elastomers, in lengths to meet customer specifications. The Neoprene covering will withstand a continuous service temperature of 200 F for several months without cracking.

Impact Wrench

F-31 Allegheny Ludlum Steel Corporation's special tool steels are being used in critical parts of the new "Swench" manual impact wrench produced by the **Marquette Division of Curtiss-Wright Corporation**, Galewood Dr., Cleveland 10, Ohio.

The wrench is especially designed for loosening tightly embedded nuts and bolts with a minimum of labor. It does not depend upon tap-like blows or steady pressure to tighten or loosen nuts. Instead, it builds up power in a strong spring and releases a twisting impact each time the handle moves more than 30 degrees.



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American-Lincoln Corporation (Lincoln Floor Machinery Co. and Wilshire Power Sweeper Co.), Toledo 3, Ohio

Benjamin Foster Co., 4635 W. Girard Ave., Philadelphia 31, Pa.

Biddle Co., James G., 1316 Arch St., Philadelphia, Pa.

Boiler Tube Company of America, McKees Rocks, Pa.

The Bunting Brass & Bronze Co., 715 Spencer, Toledo 1, Ohio

Chemical & Power Products, Inc., 11 Broadway, New York, N. Y.

Diesel Injection Sales & Service, Inc., 808 Union St., Norfolk, Va.

Dixie Bearings, Inc., 276 Memorial Dr., S.W., Atlanta 3, Ga.

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Green, Tweed & Co., North Wales, Pa.

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Kano Labs, 1047 Thompson Lane, Nashville, Tenn.

Kee Klamps North America Ltd., 1071 William St., Buffalo, N. Y.

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Subox Inc., 6 Fairmont Plant, Hackensack, N. J.

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Westinghouse Electric Corp., Box 2278, Pittsburgh 30, Pa.

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The Bird-Archer Company, 4337 North American St., Philadelphia 40, Pa.

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Clarage Fan Co., North & Porter Sts., Kalamazoo 16, Mich.

Cochrane Division, Crane Co., 3110 N. 17th St., Philadelphia 32, Pa.

Foster Wheeler Corp., 666 Fifth Avenue, New York 19, N. Y.

The Green Fuel Economizer Co., Beacon, N. Y.

Manzel, a Unit of Houdaille Industries Inc., 257 Babcock St., Buffalo 10, N. Y.

National Tube Div., United States Steel, 525 Wm. Penn Place, Pittsburgh 30, Pa.

Niagara Blower Co., Dept. SP, 405 Lexington Ave., New York 17, N. Y.

Pacific Pumps, Inc., Div. of Dresser Industries, 350 Bickett St., Huntington Park, Los Angeles, Calif.

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National Tube Div., U. S. Steel, 525 Wm. Penn Place, Pittsburgh 30, Pa.

Pittsburgh Piping & Equipment Co., 158 49th St., Pittsburgh 1, Pa.

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Babcock & Wilcox Co., 161 E. 42nd St., New York 17, N. Y.

Boiler Engineering & Supply Co., Continental Boiler Div., Phoenixville, Pa.

Boiler Tube Company of America, McKees Rocks, Pa.

Cleaver-Brooks Co., Boiler Div., Dept. A, 305 E. Keefe Ave., Milwaukee 12, Wisc.

Detroit Stoker Co., 1510 E. First St., Monroe, Mich.

Erie City Iron Works, 1422 East Avenue, Erie, Pa.

Foster Wheeler Corp., 666 Fifth Avenue, New York 19, N. Y.

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The Fairbanks Co., 393 Lafayette St., New York 3, N. Y., and 202 Division St., Rome, Ga.

The Howe Scale Co., Rutland, Vt.

The Jeffrey Mfg. Co., 898 N. 4th St., Columbus 16, Ohio

Kee Klamps North America Ltd., 1071 Williams St., Buffalo 6, N. Y.

Mathews Conveyor Co., Elwood City, Pa.

National Conveyors Co., 25 Industrial Ave., Fairview, N. J.

Otis Elevator Co., 260 11th Avenue, New York 1, N. Y.

Shepard Niles Crane & Hoist Corp., 1660 Schuyler Ave., Montour Falls, N. Y.

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Breslove Separator Co., Commonwealth Bldg., Pittsburgh 22, Pa.

The Buell Engineering Co., Inc., Dept. 80-A, 123 Williams St., New York 38, N. Y.

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Dearborn Chemical Co., Merchandise Mart, Chicago 54, Ill.

Elgin Softener Corp., 132 N. Grove Ave., Elgin, Ill.

Fairmount Chemical Co., Inc., 136 Liberty St., New York 6, N. Y.

Farris Chemical Equipment & Supply Co., Box 10116, Kingston Pike, Knoxville, Tenn.

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D. W. Haering & Co., Inc., Box 1037, San Antonio 21, Calif.

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IPCO Laboratories, Inc., 2710 Apple Valley Road, N.E., Atlanta 19, Ga.

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The Marley Co., Inc., 222 W. Gregory Blvd., Kansas City 13, Mo.

North American Mogul Products Co., Standard Bldg., Cleveland 13, Ohio

Pfandler Permutit Inc., Ionac Chemical Co., Div., Birmingham, N. J.

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Tennessee Corp., 612 Grant Bldg., Atlanta 3, Ga.

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Bussmann Mfg. Div., Dept. SPI-261, University at Jefferson, St. Louis 7, Mo.

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English Electric Export & Trading Co., 750 Third Ave., New York 17, N. Y.

Sprague Electric Co., Industrial Capacitor Div., 49 Marshall St., N. Adams, Mass.

Westinghouse Electric Corp., Box 2278, Pittsburgh 30, Pa.

Advertisers in SPI for June, 1961

Acme Industries, Inc.	27
Air Preheater Corp.	7
The Airetool Mfg. Co.	82
Anaconda Wire & Cable Co.	17
Anderson Chemical Co., Inc.	59
V. D. Anderson Company	69
Armstrong Machine Works	2
Atlantic Steel Company	81

Bussmann Mfg. Co.	66 & 67
-------------------	---------

Cherry Way Corporation	56
Clarage Fan Co.	1
Coppus Engineering Corp.	80
Detroit Stoker Company	65
Dixie Bearings, Inc.	15
The Dryden-East	90

The English Electric Corp., Inc.	Inside Front Cover
----------------------------------	--------------------

J. J. Finnigan Co., Inc.	25
--------------------------	----

The Fly Ash Arrestor Corp.	79
----------------------------	----

Gulf Oil Corporation	8 & 9
----------------------	-------

Industrial Combustion, Inc.	61
IpcO Laboratories, Inc.	75

Kano Laboratories	56
E. Keeler Company	55
M. W. Kellogg Co.	4 & 5

The Liquidometer Corp.	78
------------------------	----

Manzel Div. of Houdaille	83
The Marley Company, Inc.	73
Metco Inc.	71

Niagara Blower Co.	89
--------------------	----

Pacific Pumps, Inc., A Division of Dresser Industries	63
The Wm. Powell Co.	16

Reliance Gauge Column Co.	77
Reynolds Aluminum Supply Co.	Inside Back Cover
Riley Stoker Corporation	18 & 19

Sarco Co., Inc.	11
Standard Oil Company	20

Tennessee Corporation	56
Titusville Iron Works Div.	Back Cover

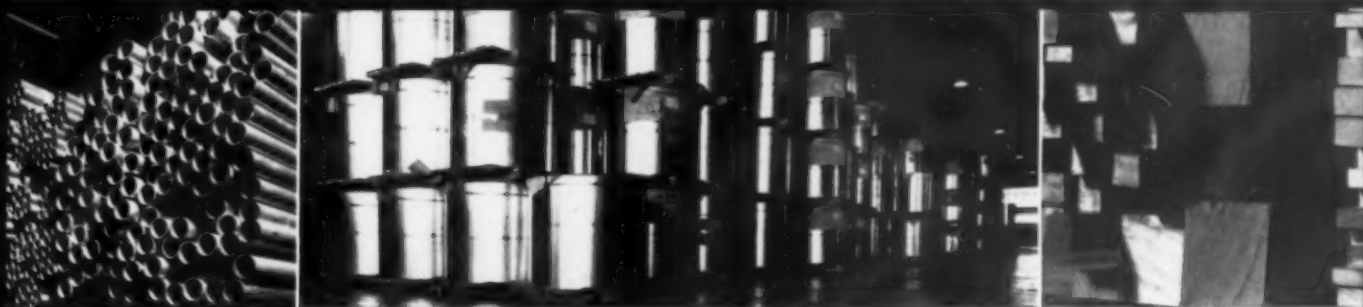
Henry Vogt Machine Company	23
----------------------------	----

Weinman Pump Mfg. Co.	76
Wickes Boiler Company	57

Yarnall-Waring Company	53
------------------------	----

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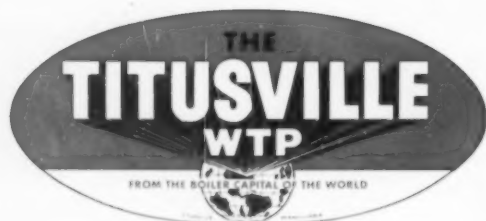
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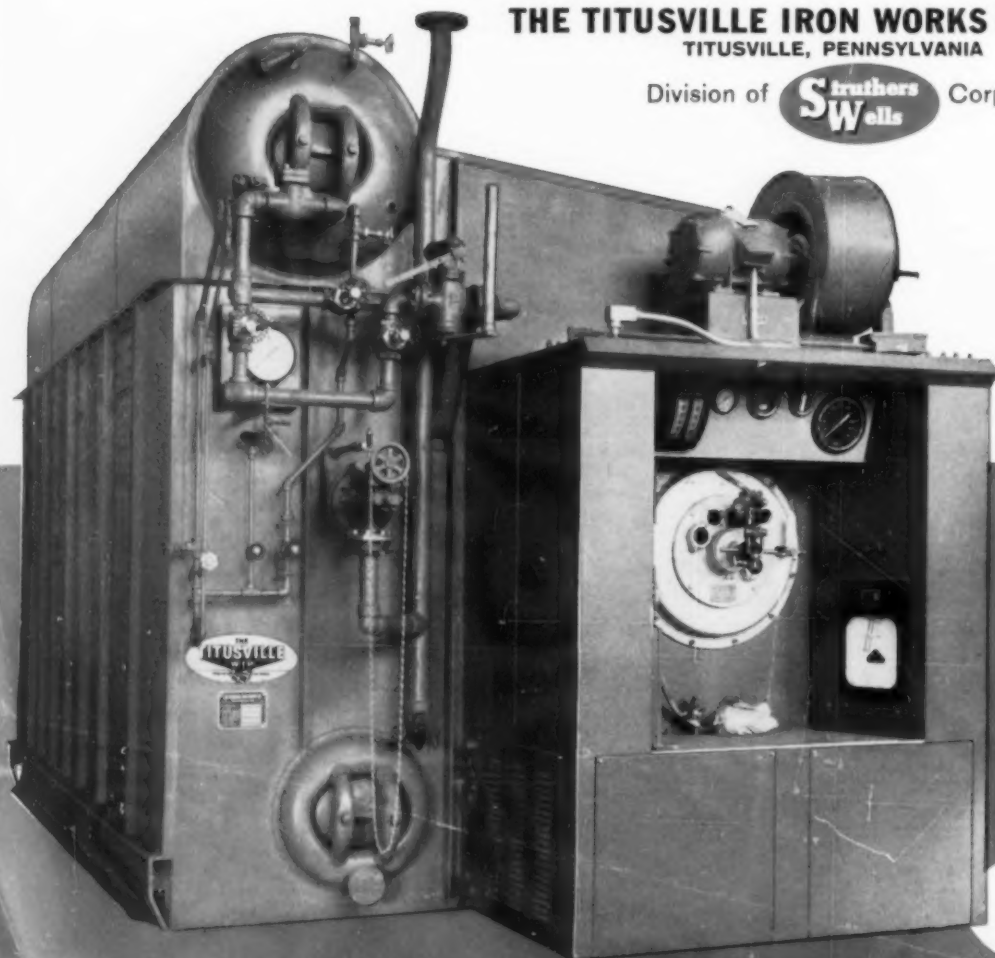
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